



FRIDAY, AUGUST 2, 1901.

CONTENTS

ILLUSTRATED:

| | |
|--|-----|
| A London Railroad Station..... | 541 |
| Whether to Strengthen the Old Bridge or Renew It?..... | 542 |
| Low-Side Gondola Car for the Union Steel Company..... | 543 |
| Terminal Improvements at Savannah..... | 544 |
| Broken Suspension Rods on Brooklyn Bridge..... | 546 |
| 40-Ton Pressed Steel Cars for the Great Southern of Spain..... | 550 |
| The Nixon Safety Staybolt Sleeve..... | 551 |

CONTRIBUTIONS:

| | |
|-----------------------------|-----|
| The Civilizing Trolley..... | 541 |
|-----------------------------|-----|

EDITORIAL:

| | |
|----------------------|----------|
| Brake Shoes..... | 548 |
| June Accidents..... | 548 |
| Editorial Notes..... | 548, 549 |

MISCELLANEOUS:

| | |
|---|-----|
| The Tropenas Steel Process..... | 543 |
| Russian Petroleum..... | 544 |
| Westinghouse Exhibits at the Pan-American..... | 545 |
| Train Accidents in the United States in June..... | 547 |
| Cultural Value of Engineering Education..... | 549 |

GENERAL NEWS:

| | |
|---------------------------------|-----|
| Technical..... | 551 |
| The Scrap Heap..... | 552 |
| Locomotive Building..... | 552 |
| Car Building..... | 552 |
| Bridge Building..... | 553 |
| Personal..... | 553 |
| Elections and Appointments..... | 554 |
| Railroad Construction..... | 554 |
| General Railroad News..... | 554 |

Contributions

The Civilizing Trolley.

Easton, Pa., July 27, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

The letter of Mr. H. E. Licks in your last issue (p. 525) was of interest to me as I have often been over the route that he describes. It seems to me that the trolley roads are acting as a civilizing agent to the "contented peasantry" of this country. The people are, in fact, awakening from a long lethargy and are beginning to develop their mental capacities. For a century they have been contented to work hard on their farms, living from April to October in one-roomed buildings, called summer kitchens, while all the windows of their houses are closed with wooden shutters. Now a few shutters are left open, and many of the men find that work in the cement mills or as trolley motormen and conductors is more pleasant and profitable than on the farm. I do

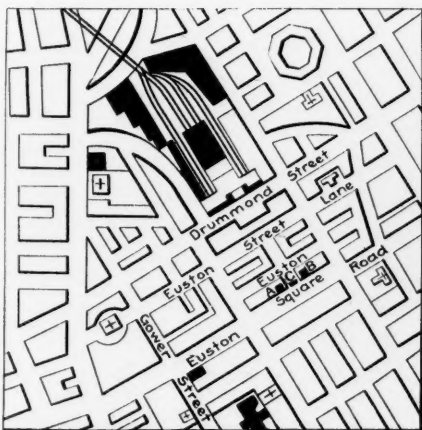


Fig. 1.—London Streets in the Vicinity of Euston Station.

not share the mournful view which Major Licks takes of the influence of the trolley road. It is already stimulating and improving the people. Allentown, Bethlehem and Easton have produced great scholars, statesmen, and financiers during the past century, and now there is a prospect that some good thing may come out of Nazareth; its cement has indeed already become well known.

This slate-belt trolley line, which has been so well described by your correspondent, draws its motormen and conductors from the Pennsylvania-German peasantry. It will take some time to train them to effective work, especially as trolley lines have few rules derived from railroad experience. Last week I was in a rear collision at Wind Gap which would not have occurred had one of the simplest rules of railroading been observed. A disabled car stood near the foot of a grade down which another car came at high speed; a slight curve prevented the motorman from seeing the disabled car until within about 500 ft. of it, and then his mental confusion was such

that after shutting off the power he neglected to apply the brake. The rear vestibule of the stationary car was completely smashed, but fortunately no passengers were injured. The disabled car had stood for half an hour at the foot of that grade, but no back flag had been sent out, although the time when the following car was to arrive was well known. The fiction of the horse car road still prevails, that the driver or motorman can see far ahead and stop his car in an instant.

On this line there is a "road officer" who rides to and fro on the cars and has authority over the motormen and conductors. I have seen him at night standing upon the front platform and incessantly conversing with the motorman. This practice is also handed down from the horse-car time, and it is likely to be the cause of serious accidents, for at high speeds all the mental capacity of the motorman should be devoted to his work, especially at night.

G. O. METER.

A London Railroad Station.

Euston Road is a portion of one of London's thoroughfares which wraps itself in an irregular curve about some of the busier portions of the city. During the morning and evening when the business folk are on the move, it is well filled with lines of cabs and busses, the orderly movement of which suggest the stream lines



Fig. 2.—Euston Road—Lodges Marking Approach to Euston Station.

of a rapidly flowing river. Beneath the surface of the street runs the Metropolitan underground railroad. At intervals the usual pavement of wood gives way to good-sized iron gratings, which serve to ventilate the tunnel below, and on these children disport themselves. Each approaching train pushes the air of the tunnel out through the grating, extending the skirts of the girls who, jumping about in their frolic, have the appearance of a bevy of ballet dancers. When the dance is at its height, the sound of machinery, and sometimes a slight suggestion of steam at the grating, marks the passage of the locomotive. In a moment the conditions above the grating are changed. The air current is reversed. The suction caused by the receding train draws the skirts of the children close about their bodies. The song of the dance gives way to discordant cries as with bended knee



Fig. 4.—The Hall of Euston Station—Statue of George Stephenson.

each child clutches wildly at raiment or streaming hair as if fearful that everything was to be drawn from them. But the effect of the receding train diminishes and soon disappears, the children become quiet and separate for their play about the street until some one discovers that another train is approaching, when all assemble to repeat the dance.

Euston Road, with Marylebone Road, which joins it and constitutes a part of the same thoroughfare, is a street of railroad stations. At intervals of a half mile or less throughout its course are stations of the "Underground." At one extremity are the Kings' Cross Station and the St. Pancras Station, the former the terminus of the Midland Railroad, and the latter that of the Great Northern. At the other extremity is the Marylebone Station, the London terminus of the Great Central Railroad, and within easy reach is Euston Station, the extensive terminus of the London & North Western. This station, while in fact on Drummond street, which is three squares north of Euston Road, has by clever

devices been put in such communication with the great thoroughfare that the stranger readily accepts the printed statement to the effect that it is on Euston Road (Fig. 1).

Following the usual line of approach, the first intimation of the presence of the great station which appeals to the stranger, is that presented by Fig. 2. He is on Euston Road. The gardens of Euston Square are on his left and Endsleigh Gardens are on his right. But a way opens through the gardens on the left, on either side of which, rising out of the green of the gardens, are two beautiful, brown stone building, monumental in design, the one a perfect counterpart of the other. The window of one bears in small, white letters the words "west lodge," and of the other "east lodge." A fine bronze statue stands at the entrance in the middle of the way between the lodges and back of this on a tall lamp post is a neat double-faced sign bearing the legend "Euston Station and Hotel," with an extended finger pointing the way. The garden fences turn the corners in graceful curves, and at the turn are faced by bill boards lettered along the top to read in a single line, "London & North Western Railway." The entrance is an artistic one. The signs made up of white letters, good in form, on a dark blue ground, are just sufficient to supply the proper explanation, and even the posted bills are so clean and well kept that they do not impair the harmony of the view.



Fig. 3.—Drummond Street and the Portal of Euston Station.

Approaching more closely to the statue the traveler reads, "Robert Stephenson. Born October 16th, 1803. Died October 12th, 1859." And is thus reminded at the gateway of the great station of the two engineers who, as father and son, worked together in the early development of railroad structures and equipment. The road to which the station belongs is in fact but a development of the Stockton and Darlington line, over which the Rocket made its triumphant runs. A statue of the elder Stephenson is reserved for the station itself.

Looking beyond the statue one sees the way apparently ending a couple of blocks distant in a fine brown stone building surmounted by a clock, which has somewhat the appearance of a railroad station. Passing rows of inferior hotels at the right and left which manifestly have nothing to do with the more dignified structure be-



Fig. 5.—A Platform View—Euston Station.

yond, he soon discovers that, while he is walking in the right direction, the building ahead is not the station, but Euston Hotel. It is the railroad hotel, and this, in England, is a guarantee of its quality. Having reached the front of the hotel in Euston Street Lane one discovers that the way passes under it; that there is a separate way for horse and foot in each direction. Passing by the way that leads through the great building, one finds himself in an open court of considerable size, walled on either side by wings of the hotel, with Drummond street beyond. Immediately in front and across the street is the magnificent "Euston Portal," illustrations of which are much used in the advertisements of the North Western, and which marks the real entrance of the station. The imposing character of the portal is best seen by one standing directly in front of it, but as the photograph which was intended to preserve this view failed, we shall need to walk down Drummond street and satisfy ourselves with an oblique view, such as is shown by Fig. 3. This makes the structure appear much narrower

than it really is, and gives no conception of the real artistic merit of the entrance. Between its fluted columns a broad way is afforded for vehicles, and on either side are walks for pedestrians. The frieze bears in letters of plain outline the single word "Euston." But the portal is not the only way by which the station may be entered for, as may be seen from the view, a succession of minor gateways are located on either side. By some of these, cabs may pass by roadways extending parallel with the train shed platforms, so close to trains that passengers alighting have but a few steps to their carriage.

Approaching by way of the portal, one enters into an inner court, three sides of which are bounded by portions of the station building.

From the inner court of the Euston Station, one may pass into the waiting room or, avoiding this, may go directly to the train sheds. The waiting room has the form of a rectangular hall, 40 or 50 ft. wide, and 60 or 80 ft. long. Its walls are of stone. At one end, flights of broad steps rise to an iron gallery extending around the walls, giving access to doors at the end. The furniture of the hall is simple and even severe in its plainness, and as there are other rooms in which travelers

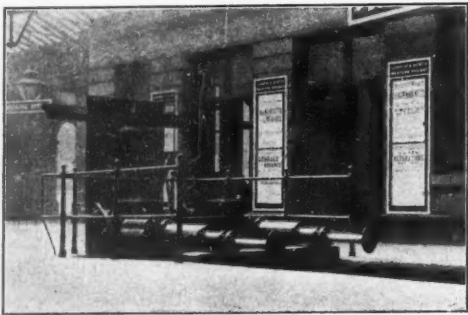


Fig. 6.—Buffing Post—Euston Station.

may wait, and as ticket offices are virtually in the train sheds, he has but little occasion to tarry in the hall of Euston Station. Perhaps as matters now stand, the principal excuse for its existence is to be found in the presence within its walls of the fine heroic white marble statue of George Stephenson (Fig. 4), to which reference has already been made. Before the pedestal which bears the statue of the great man, in a glass case is a miniature model of the locomotive Rocket, in the design and construction of which more than in any other one thing that he ever did, George Stephenson gave evidence of his power. The presence of the statues of the two Stephensons in the path of all who enter or leave the great city by the London & North Western illustrates the thoroughness with which England records her deeds in her monuments. So well is this done that no man or child can long walk the streets of London without becoming familiar with the essential facts of her history.

Outside of the main hall and in close proximity to the tracks, are the ticket offices ("booking offices"), minor waiting and toilet rooms of different classes, refreshment rooms and parcel rooms. The extensive train sheds consist of a succession of comparatively low roofs which carry large areas of glass. Everything about is clean, well lighted, and otherwise attractive. A view of a typical section of the shed is given in Fig. 5. The local passenger train to be seen in this view on track 9, came in just before the photograph was taken. The view shows also a transverse gangway extending across the foreground of the picture, which serves in the movement of baggage. Vehicles from the street expecting to receive passengers from incoming trains may in this section of the shed drive down to this transverse gangway, but in certain other sections may, as already noted, pass over a broad drive between the tracks to a point close to the incoming coaches.

As a fitting conclusion to these rambling notes reference should be made to the buffing mechanism (Fig. 6) which stands guard at the ends of the station tracks. It is impracticable to apply the American term of bumping post to this appliance, for this is a complete machine. As English cars carry two widely spaced spring buffers at either end, so the buffing machine presents two surfaces of contact spaced so as to engage the buffers of the car. Each contact plate is carried by a piston rod entering a cylinder and the cylinders are planted upon a heavy framework of wood or iron. The external appearance indicates that the cylinders are filled with oil or water and that the whole is designed to operate much like the recoil absorbing devices used on gun carriages. The rods of the machine illustrated have a diameter of about 4 in. and extend about 3 ft. beyond the cylinders. A similar machine installed at one end of the elevated road which runs along the docks at Liverpool is provided with a length of rod and cylinder greater than those described, the desired length being proportional to the extra hazard involved in the operation of trains above the level of the street. The buffer of the Liverpool Elevated has a movement of piston of about 8 ft., the long highly polished piston rod backed by the black cylinders, having a very business-like appearance. Again, in the station at Cologne are buffing machines even more elaborate than those which have been described. The rods are 5 in. in diam. and provide for a movement of piston estimated to equal 10 ft. They connect at their outer end with a single

transverse member, the extremities of which are guided by an extension of the frame of the machine after the manner of a cross-head. The guides are spaced sufficiently wide to allow a car which might impress itself upon the machine to pass between them. The cylinders are about 18 in. in diam. and are piped to an elaborate system of relief valves which connect them with a riveted sheet metal drum extending across and above the cylinders. The drum is of heavy material and its purpose is evidently to receive the liquid displaced from the cylinders, and probably, also, to confine air which, if retained, would be compressed by the action of the machine, thus constituting the final element which, in the action of the machine, absorbs the energy impressed upon it. The parts described are mounted on a heavy well-designed cast-iron frame securely bolted to a foundation. The machine is inscribed with, "Hydraulischer Prellbock, C. Hoppe, Berlin, 1895." The writer never had the pleasure of seeing one of these machines in action, but has often wished to do so.

W. F. M. G.

Whether to Strengthen the Old Bridge or Renew It?

BY H. G. TYRRELL.

It is often necessary for the engineer to answer this question. There are throughout the country many bridges built according to the requirements of their time, but too light for modern loads, and this class includes both railroad and highway bridges.

In the case of alteration, the pound price of new material in place is very high, owing to the large amount of field drilling and riveting required. In estimating the amount of such work in any special case, it is well to be very liberal, for there is nearly always much to be done that was not seen at first.

In the case of certain antiquated types of bridges, the question of strengthening them would rarely be considered, as they do not conform at all to modern methods of construction. Examples of this kind are found in bridges of the Truesdale patent, and cast iron truss bridges that still exist. But in truss and girder bridges of more modern form alteration is often practicable.

In the city of Boston there has recently been considerable alteration done, necessitated largely by the relocation of tracks to suit the position of the new South Terminal Station. A low truss street bridge at Columbus avenue had an extra panel added, with additional cover plates on the flanges. The plate girder retractible draw-bridge across the Mystic River to Chelsea was lengthened 5 ft. by adding to the web and flanges, and riveting on new cover plates.

In case of renewing the bridge, an important consid-

be replaced. Interest, too, must be added, for the bridge may be in stock for years before being resold.

The whole subject may be illustrated by a case that came to the writer's notice a short time ago. One of the large railroad systems purchased a smaller road, and on the latter was a bridge 1,100 ft. long of four spans 200 ft. each and a 300-ft. swing span. It was built many years ago from plans by J. H. Linville, and was proportioned for a uniform live load of 2,400 lbs. per foot of bridge. The specifications of the main railroad system called for a uniform live load of 4,000 lbs. per foot of bridge, preceded by two engines weighing 135 tons each. The style of bridge is shown in the illustration. The trusses are 25½ ft. deep, and have four systems. There are no verticals excepting the end posts, and the web members are inclined at an angle of 45 degrees. The struts are tubular, and are intersected at three points. Ties are arranged in pairs. Floor beams are suspended and consist of two 15-in. beams, weighing 57 lbs. per foot. Panel length is 12 ft. 10½ in., and stringers are yellow pine. An examination of one fixed span was made with the following results:

It was found that an entirely new floor system was required, which, when figured out, weighed 62 tons per span. This could probably be built for \$60 per ton in place. The weight of additional material to reinforce the trusses was 70 tons per span, which was figured at \$100 per ton in place, to cover the cost of field drilling and riveting the existing work. The top chord and end posts were of the usual box form, and the intention was to add new side plates in the channels, with another cover plate on top, and flats on the lower flange of channel. The lower chord contained eye bars only, and to this new ones must be added. The web must receive new flats and channel bars. The pins seemed to be the weakest part, many of them being only 3½ in. diameter. It appeared as if they had been figured for shearing only.

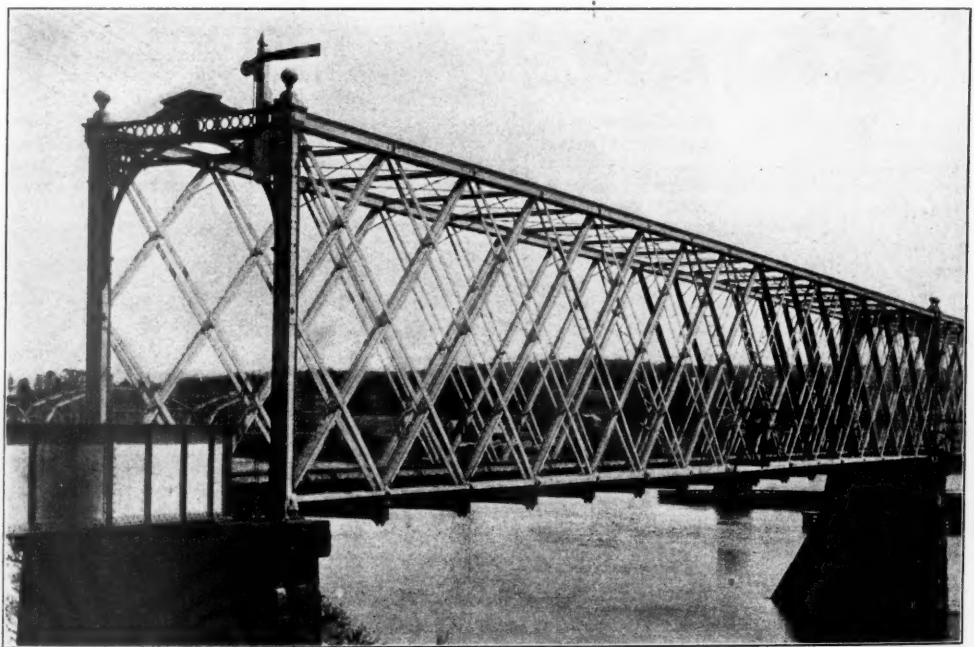
An estimated cost of strengthening one span was as follows:

| | |
|--------------------------------------|---------|
| 62 tons steel, at \$60 per ton..... | \$3,720 |
| 70 tons steel, at \$100 per ton..... | 7,000 |

| | |
|--|----------|
| Total | \$10,720 |
| Less value of 20 tons scrap iron in old floor, at \$25 per ton | 500 |

Net cost of strengthening one span.....\$10,220

To estimate the net cost of an entirely new span, it was necessary to first find the approximate value of the old one. It would no doubt bring the highest price if sold for use on a lighter railroad. But the chances of making such disposal were thought too small to count on. As it contained about 100 tons of iron per span, its scrap value at \$25 per ton was about \$2,500, less the cost



Air Line Bridge Across the Connecticut River at Middletown, Conn.

eration is what disposal to make of the old one. But in the case of old and out of date types, the bridge is seldom worth more than enough to cover the cost of removal. In other words, it may well be given away to any one who will take it. Heavier bridges having a higher scrap value may bring some revenue. In the case of the temporary steel bridge across the Connecticut River at Hartford, built in the summer of 1896, the price paid by the state for the superstructure was \$22,000. In the contract was a clause stating that when a permanent bridge was built, the old temporary one would be bought back again by the contractors for the sum of \$5,000, or less than one-quarter of its original cost. This price seems small, but it must be remembered that before the bridge could be used again elsewhere, it must be taken down and transported to the contractor's yard. Bolts and rivets would be unfit for use again, and lumber must be entirely new. Besides this there are always some pieces damaged in handling, and these must

of removal. For highway use it would be serviceable only for a rural district, as the 15-ft. roadway would not be sufficient for city or even suburban use. The value of an ordinary country highway bridge of this span is about \$3,600. Assuming that this price could at some future time be secured for the old span, we find the value of one span to be \$3,600 less \$1,500 for removal, or \$2,100 net. A new railroad bridge span for heavy loads would contain 190 tons of steel. This at \$70 per ton in place is worth \$13,300. The net cost, then, of a new bridge is as follows:

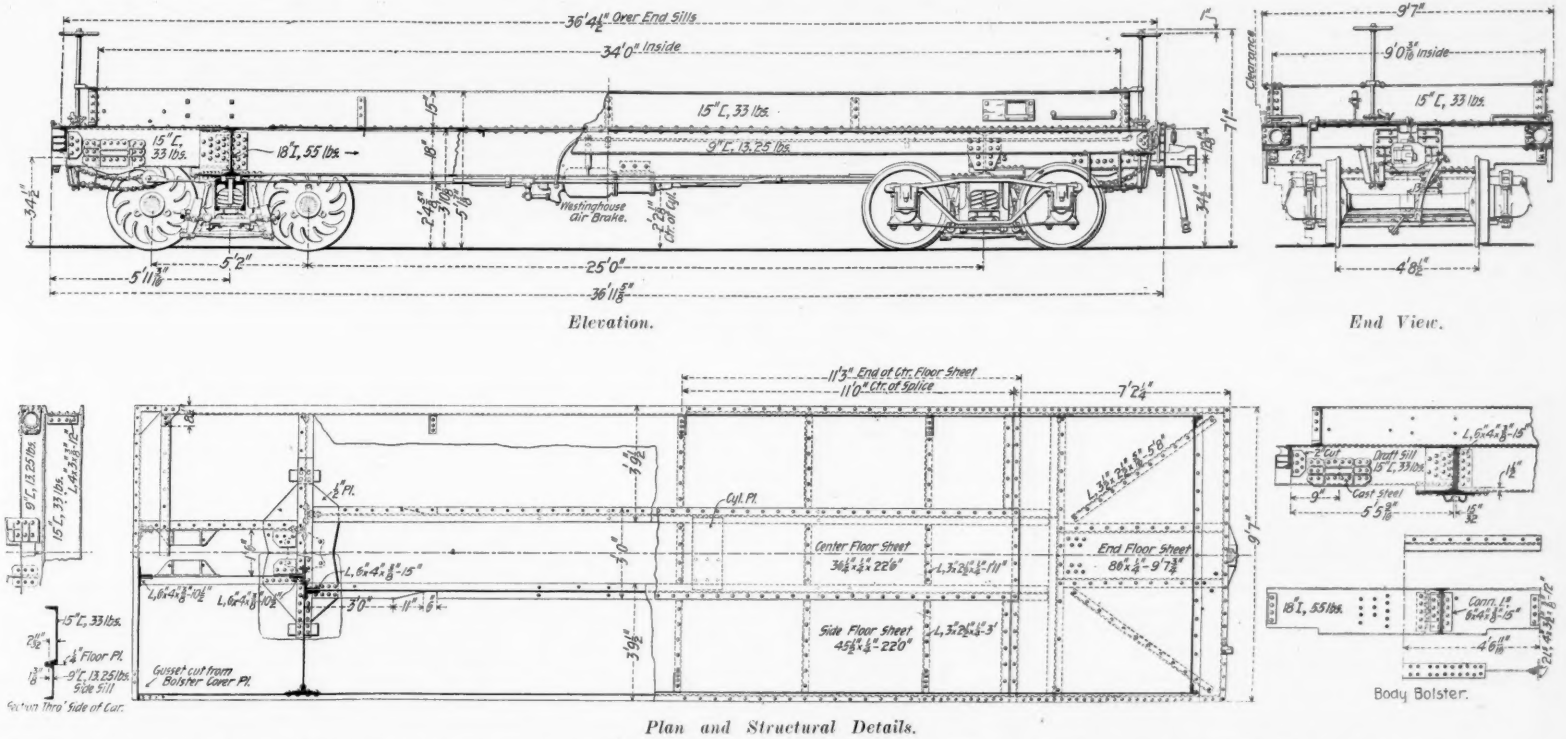
| | |
|---|----------|
| Cost of new span..... | \$13,300 |
| Less value of old bridge for highway use..... | 2,100 |
| Net cost of one new span..... | \$11,200 |

Therefore, as the total cost of an entirely new bridge was only 10 per cent. more than the cost of strengthening the old one, and as patched up work is nearly always unsatisfactory, the writer reported the strengthening of the old spans as impracticable.

Low-Side Gondola Car for the Union Steel Company.

The American Car & Foundry Co. is building 40 steel, low-side gondola cars for the Union Steel Co. from designs of Mr. George I. King, the Manager of the Steel Car Department. These cars are designed for a load limit of 110,000 lbs. using the 1900 standard specifications of the builders. Reference to the following data from the calculations of stresses shows that the members are amply stiff to care for the greatest loading to which they may be subjected:

| Assumed Loading. | |
|---|----------------------|
| A. C. & F. Co.'s specifications, 1900... | 5½ x 10 in. journals |
| Base dead load..... | 32,000 lbs. |
| Maximum live load..... | 120,000 " |
| Weight of A. C. & F. Co.'s S-1 trucks..... | 14,400 " |
| Deduct weight of wheels and axles..... | 8,400 " |
| Weight of truck materials above axles..... | 6,000 " |
| Gross body dead load = 32,000 - 6,000..... | 26,000 " |
| Deduct for bolsters, etc..... | 2,000 " |
| Net body dead load..... | 24,000 " |
| Assumed live load..... | 120,000 " |
| Total static body load..... | 144,000 " |
| Add 50 per cent..... | 72,000 " |
| Final uniformly distributed load..... | 216,000 " |
| Total floor area (34 x 9 ft.)..... | 306 sq. ft. |
| Final uniformly distributed load per square foot of floor area..... | 706 lbs. |
| Center Sills. | |
| Maximum moment..... | 150,000 ft. lbs. |
| S. required at 16,400 lbs. per square inch..... | 109.7 |
| 1 18 in. I, 55 lbs..... | S. |
| 1 top plate, 22 in. x ½ in..... | 94 |
| 1 top plate, 8 in. x ¼ in..... | |



Steel Low-Side Gondola Car, 50-ton Capacity, for the Union Steel Co.—Designed and Built by the American Car & Foundry Co.

| Side Sills. | |
|---|------------------|
| Maximum moment..... | 52,563 ft. lbs. |
| S. required at 16,400 lbs. per square inch..... | 38. |
| 1 15 in. I, 33 lbs..... | S. |
| 1 9 in. I, 13.25 lbs..... | 62. |
| 1 plate, 6 in. x ¼ in..... | |
| Bolster. | |
| Maximum moment..... | 186,950 ft. lbs. |
| S. required at 15,000 lbs. per square inch..... | 150. |
| 1 18 in. I, 55 lbs..... | 38. |
| 1 top plate, 24 in. x ¾ in..... | S. |
| 1 bottom plate, 24 in. x ½ in..... | 273. |
| Estimated weight..... | 31,700 lbs. |
| Capacity level full..... | 382 cu. ft. |
| Capacity top of 30° heap..... | 744 cu. ft. |
| Dead weight per cu. ft. capacity..... | 42.6 lbs. |
| Per cent. dead weight of total load..... | 22.4 |
| Per cent. revenue freight of total load..... | 77.6 |

It will be noted that the estimated weight of the car empty is 31,700 lbs., making the percentage of dead weight to total load 22.4 and the dead weight per cubic foot of capacity 42.6 lbs.

From the drawings it will be seen that the framing of this car is novel. The center sills are 18-in. 55-lb. I beams extending only between the body bolsters, the body bolsters being of the same section as the center sills. By using the short center sills, the bolsters can be made unusually deep and continuous between the side sills. The side sills are 9-in., 13.25-lb. channels with the flanges turned outward and the ¼-in. floor plates cover the top flanges of these sills. Directly above the side sills are 15-in. 33-lb. channels, which serve to confine the lading and also to assist the side sills to carry a portion of the load. The draft sills are 15-in. 33-lb. channels spaced 18 in. apart to suit the draft gear, and extending back to the bolsters. The end sills are 9-in. channels, and the ends of the car body are 15-in. channels, the same as the sides. It will be seen that in this car it is unnecessary to cut away the end sill to make room for the coupler, and that the connections joining the center sills and draft sills to the body bolsters are very heavy. The arrangement of the floor plates is clearly shown by the engravings. The whole design has been worked out with a view to using automatic punching machines, and also to do machine riveting wherever possible.

The draft attachments are cast steel, similar to the design illustrated in our issue of June 21. Cast steel is also used for center plates, buffer castings and push pole pockets. The trucks are of the arch bar type as illustrated in detail May 17, having cast steel end castings and cast steel truck bolsters.

The Tropenas Steel Process.*

A great development has taken place within the past few years, in the application of steel castings to machine construction in lieu of forgings or castings of other metals. This has been due to a number of valuable characteristics of steel castings, which make their use suitable to a large variety of work. Chief among these features is the ability to obtain a metal of high tensile strength and ductility, in shapes difficult or impracticable to forge, and at a price in most cases lower than that of a forging. Machine parts formerly made in cast or wrought iron can be considerably reduced in weight by the substitution of steel. This fact has been appreciated by the railroad companies in particular, as applied to locomotives and car designs. As an instance of this, a reduction in weight of nearly four tons was made on a passenger locomotive by the substitution of steel castings for forgings and iron castings. Steel castings can also be made of high magnetic permeability, and have therefore been largely adopted by manufacturers of electrical machinery.

ations in orders, or by the capacity of the molding and pouring floors. The open-hearth furnace, to be worked economically, must be run day and night in order to avoid the loss in gas and labor entailed in keeping the furnace hot while idle. But with the converter process, the principal sources of expense are stopped when the pouring is finished.

In order to obtain sufficiently hot steel by the Bessemer process, a number of modifications have been made in the original process, by variations in the method or place of introducing the blast. The best known of these methods are the Robert, the Walrand-Legenis, and the Tropenas processes, named after their inventors. In the Robert process, the blast is introduced on the side of the converter, while in the Tropenas, the blast is directed upon the surface of the bath. The Walrand-Legenis process makes use of much smaller charges than the other two, and the blast is delivered in the ordinary way, at the bottom of the vessel. As to the success with which these various processes have fulfilled the practical requirements demanded of them—for uniform quality and cheapness of output—it may be stated that the first two processes named have not met with the general approval which the claims put forth for them would warrant. The Tropenas process, though only recently introduced into the United States, is now being operated here in a number of foundries.

The largest installation of the Tropenas process in this country is at the works of the Sargent Company at Chicago Heights, Ill. In this plant three converters of a capacity of two tons per blow, each give a total daily

Steel for castings is now made by the three following processes or modifications of them: 1. The open-hearth process. 2. The crucible process. 3. The Bessemer process. These will be discussed in relation to their application to the manufacture of small steel castings weighing from a few ounces to several pounds, the economical manufacture of which demands certain special characteristics of the molten metal over that employed for larger castings.

The open-hearth process is particularly suited for the manufacture of large castings, owing to the comparative cheapness and uniformity of the melted metal. In making small castings of thin section, it is essential that the metal be very hot and fluid as it is poured into the mold, since molten steel cools with great rapidity and will otherwise not completely fill up the mold. It is commercially impracticable to make small castings from open-hearth steel on account of the large amount of metal which would be lost by skulls in the ladles and by bad castings. Moreover, as ordinarily operated, the capacity of the furnace ranges from eight tons upward and this must all be tapped at one time. These facts necessitate having the pouring floor set with molds to the capacity of the heat and thus in the manufacture of small castings a very large pouring floor is required.

Small castings are made very satisfactorily from crucible steel. The objections raised to this process are its high cost of operation and the large equipment required in proportion to the tonnage of material manufactured.

The Bessemer process recommends itself for a number of reasons as an acceptable method of producing steel for small castings. Presuming that a sufficiently hot and quiet steel of the proper quality can be obtained, one of the greatest advantages it offers is the elasticity in the quantity of its product. With a converter of, say, two tons capacity the output may be governed by the fluctu-

output of 50 tons. The steel foundry building covers a floor space 50 ft. wide x 200 ft. long, served by two electric traveling cranes. The three converters are placed in a row in an opening in the side wall at the south end of the main building. Behind these converters, in a separate addition erected for the purpose, are two cupolas which furnish the melted pig iron and scrap from which the steel is made. The cupolas are set on high foundations, and deliver the melted metal to the converters by gravity through hinged spouts which can be turned out of the way during the time of the blow.

The converter is lined with ganister, and consists of a shell of ½-in. steel plate fitted with two hollow trunnions supported on pedestals. By means of the trunnions the converter may be tilted as desired for charging, for blowing, or for pouring the steel into the ladles. One of the trunnions is connected with the wind pipe from the blower, and conducts the blast to the wind boxes at the rear of the converter. On the converter trunnion opposite to that delivering the blast, a large sprocket wheel is fitted, over which passes a chain fastened to two pistons working in a pair of cylinders placed side by side in a pit below the floor line. This apparatus, operated by hydraulic power and controlled by valves at the blowing platform, furnishes the means of tilting the converter. The hydraulic pump, accumulator, etc., are situated in an adjoining room.

The air blast is obtained from a Root rotary positive-pressure blower directly connected to a 65-h.p. motor. This blast is delivered to the converters through a 12-in. main at a maximum pressure of 4½ lbs. per sq. in. The pressure of the blast is regulated at the blowing platform by means of a gate valve on an 8-in. by-pass from the main air pipe. The quantity of compressed air required is from 770 to 880 cu. ft. per minute per ton of pig iron treated.

The arrangement of the buyers is the chief peculiarity of the Tropenas over the so-called "Baby" Bessemer

*From an article by Mr. E. L. Adams, of the Sargent Co., published in the *Technograph*, the annual publication of the University of Illinois.

†Illustrated in our issue of Aug. 31, 1900.—Ed.

processes. The wind boxes previously mentioned are independent of each other. The lower wind box connects with a row of horizontal round tuyeres known as "fining" tuyeres or "tuyeres of reaction," placed in a lining above the position of the surface of the bath. The upper wind box opens into a row of flattened tuyeres of a smaller section than that of the lower ones and about 6 in. above them. These tuyeres are known as "tuyeres of combustion." The blast for the upper tuyeres can be operated independently of the lower tuyeres. All the tuyeres are placed in the horizontal plane in order to prevent the blast from causing any gyratory action on the bath.

In the Walrand-Legenis process, the air is blown through the bath at a considerably greater pressure than that used in the Tropenas process, and the metal is placed in a violent state of ebullition. The aim of the Tropenas process is to keep the bath as quiet as possible, the claim of the inventor being that "the most impure steel manufactured by the pneumatic process is that produced from a bath which has received the largest amount of churning in its molten state." For the same reason also the shape of the lining is such that the surface of the bath exposed to the blast is small in comparison with the quantity of metal in the bath.

The operation of the converter is as follows: The pig iron and scrap are first melted in the cupola. The chemical analysis of the pig iron employed is within the following limits:

| | |
|-----------------|-----------------------------|
| Silicon | from 2.50 to 3.50 per cent. |
| Manganese | from 0.50 to 1.25 per cent. |
| Carbon | from 3.00 to 4.50 per cent. |

The phosphorous and sulphur contents should be as low as possible, the sulphur not exceeding 0.06 per cent. and the phosphorous 0.07 per cent. The proportion of scrap which can be charged with the pig iron varies with the analysis of the pig iron. Before the converters can receive the melted iron, its lining must be brought up to a high heat. This is done by means of an oil flame. When the proper amount of iron has been tapped into the converter, the blast is turned on so as to bring the lower tuyeres just above the surface of the blast.

The complete operation of the blow is divided into three periods, the whole blow taking from 16 to 22 minutes, depending upon the quality of the metal charged. The first period is the time during which the silicon is being oxidized, and lasts until the carbon begins to become oxidized. In a normal blow, this period lasts from four to eight minutes, during which time about 4½ lbs. air pressure is carried and the upper tuyeres are not used. The second period commences when the carbon flame is well up above the mouth of the converter. The pressure is then reduced to 3 lbs. and kept at that point until the carbon flame is perfectly white, when the upper tuyere valve is opened and the pressure is again slightly reduced. The second period is the boiling point and lasts from four to eight minutes. At the end of this period, the flame drops rather suddenly. In the third period, the blast is gradually increased and the flame again increases and fluctuates and finally begins to turn red, first at the top of the flame and then at the edges. At this point the blow is finished, the converter is lowered, and the blast turned on. There now remains in the converter a bath of nearly pure iron. The proper proportions of the carbon, manganese, and silicon contents of the steel required are brought up by additions of ferro-manganese or ferro-silicon, or both of these, to the bath in the converter and the metal is poured into the ladles as required. By changing the proportion of the final additions or "dose," steel may be obtained varying in quality from the softest to the hardest grades.

By the use of the upper tuyeres, the carbon monoxide liberated from the bath is changed to carbonic acid gas, which adds to the temperature of the steel without increasing its cost. The steel thus obtained is very hot and fluid. The high temperature attained during conversion is mainly produced by the burning out of the carbon, manganese and silicon. The iron charged into the converter has a temperature of about 2,300 deg. F., which is raised to about 3,100 deg. F. during the period of the blow. The silicon furnishes the fuel for most of this rise in temperature, it being estimated that each 1 per cent. of silicon thus burned is equivalent to a rise in the temperature of the bath of 500 deg. F. As previously stated, the bath at the end of the blow before the dose is added, is nearly pure iron. Samples of this metal have shown an analysis only 0.20 to 0.25 of 1 per cent. of impurities. From this metal castings may be produced of great magnetic permeability approximating that of Swedish iron. In respect to the physical qualities of the steel produced by the Tropenas process high results have been obtained from tests. Tests made upon annealed specimens have shown 65,000 lbs. tensile strength per sq. in., with an elongation in 2 in. of 35 per cent. and a reduction in area of 40 per cent.

Among the factors tending to militate against the commercial success of the Tropenas process are its complexity and the waste of metal during the operation. This loss in cupola and converter runs from 17 per cent. up.

Russian Petroleum.

The petroleum industry of Russia grows, but apparently less rapidly than formerly. The statistics are slow in coming to light, and we now have to deal with those for 1899. To make comparisons with American production

easier, we reduce poods (36 lbs.) to gallons at the rate of 5 gals. per pood. The production in the six years named has been, in millions of gallons.

| | | | | |
|-------|-------|-------|-------|-------|
| 1890. | 1893. | 1896. | 1898. | 1899. |
| 1,130 | 1,625 | 1,943 | 2,430 | 2,626 |

After all, comparisons of quantities of crude petroleum are likely to be misleading, because the quality is very different from that of American crude, the Russian yielding a very much smaller proportion of illuminating oil, in that apparently holding a mean between the Pennsylvania and the recently discovered Texas oil.

The quality of the Russian is sufficiently indicated by its products when distilled, which, in 1899, were 552 million gals. of petroleum (illuminating oil), 56½ of lubricating oil, 2½ of "solar" oil, 1¼ of benzine, and 1,155 millions of residuum, which latter is now one of the chief steam-making fuels of Russia. This, however, accounts for but about two-thirds of the production of crude; so that there must have been a great increase in consumption of crude, as well as residuum, for fuel.

Terminal Improvements at Savannah.

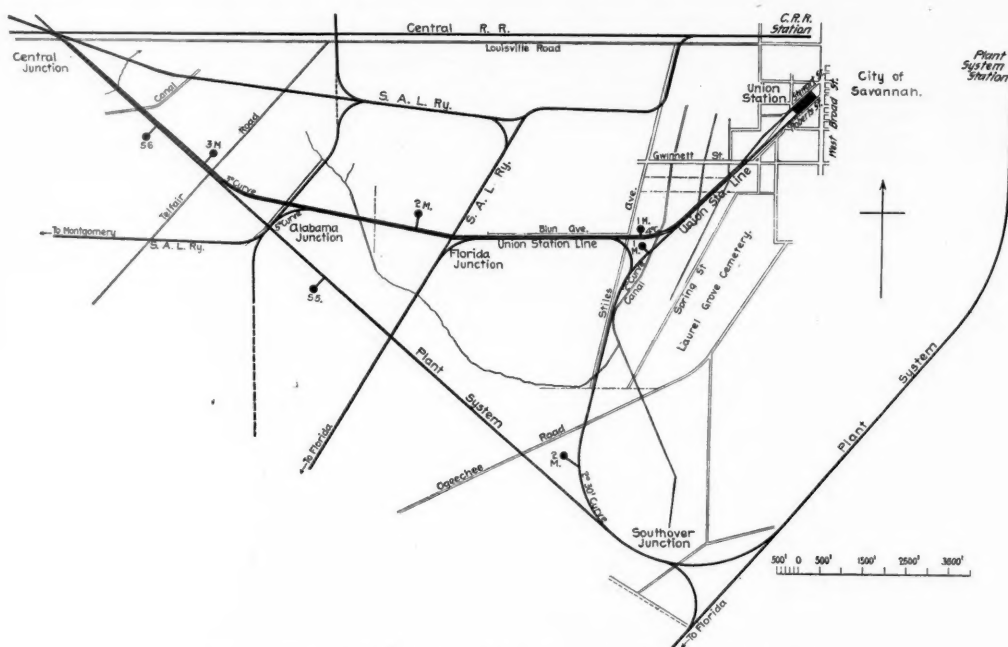
When the Greater Seaboard Air-Line System was being welded together two or three years ago one of the important problems was to provide adequate terminal facilities at Savannah, Ga. At that time the Georgia & Alabama, the constituent company at that point, had trackage rights over the Central of Georgia from Meldrim into Savannah, about 17 miles, at a rental of \$8,000 a year and the proportional cost of operation and maintenance. It was also paying rent for the use of the freight and passenger terminals of the Central of Georgia and the Ocean Steamship Company within the city of

Savannah. But this use of another company's property, though temporarily satisfactory, was not considered desirable as a permanent arrangement. The solution of the problem has been found in building a new line from Meldrim into Savannah and establishing new terminals on Hutchinson Island opposite the city of Savannah and on the north bank of the Savannah River. This work has been done by the Georgia & Alabama Terminal Company, controlled by the Seaboard Air-Line.

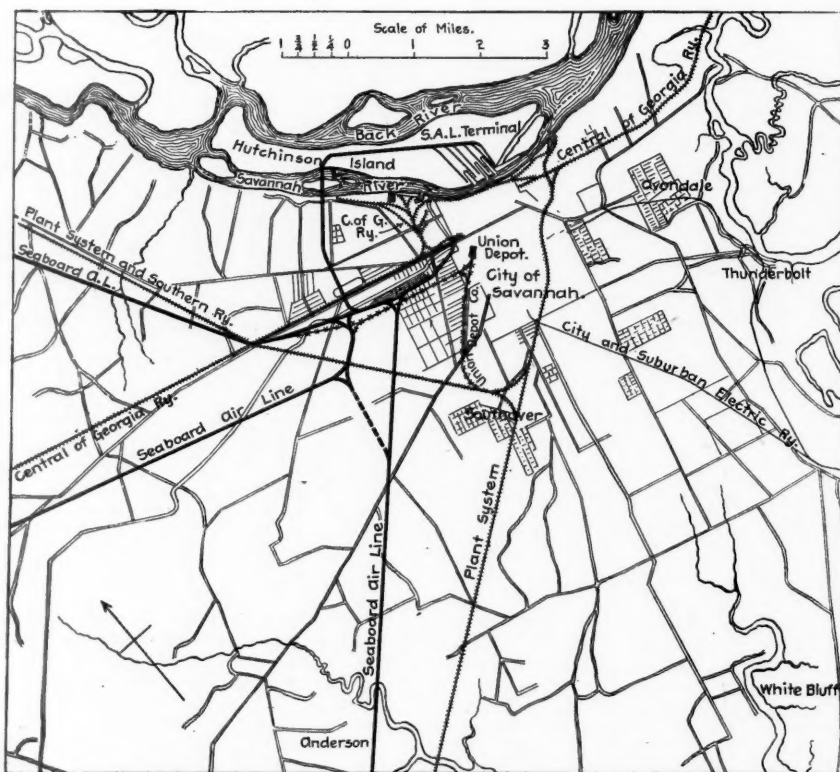
Two years ago Hutchinson Island was a rice swamp and at high tide most of its surface was under water. The Seaboard bought 1,300 acres, of which it has developed about one-third at a cost of \$1,150,000. The reclaimed land was raised 2 ft. higher than the dock property on the Savannah side of the river. The filling was made with dirt dredged from the slips and riverbed by two suction dredges, each of 16,000 cu. yds. capacity. The dredging and building required 18 months and the property was opened on July 1 last year. There is a minimum of 20 ft. of water in the slips at low tide.

The water front property is composed of four piers with three intervening slips. The largest pier is the one furthest east, Pier No. 1. This is used for naval stores and has a capacity of 65,000 bbls. of resin and 13,500 bbls. of turpentine. It was thought at the time the docks were planned that this would be a capacity sufficient for several years; but the demand is already double the present capacity, due to the separation of the property by water from the city, and at the same time to its accessibility. Plans are under consideration for enlarging these facilities.

Pier No. 2 is devoted to lumber. The slip berths on the east side are in saw-tooth form, accommodating 11 vessels at the same time, and during the active season



Sketch Map of Railroads to Union Passenger Station—Savannah.



Union Station and Seaboard Air Line Terminal on Hutchinson Island, Savannah.

all are needed. Pier No. 3 is much broader than the others and is used for cotton compressing and storing. There are two compresses on the pier, both owned and operated by private companies. The fourth and last pier is used for general merchandise. There bulk is broken and cars loaded and unloaded for the local trade. Goods to and from the city are lightered across the river. Altogether the slips and wharves supply berths for 43 vessels and the entire length of the water front is $1\frac{1}{2}$ miles.

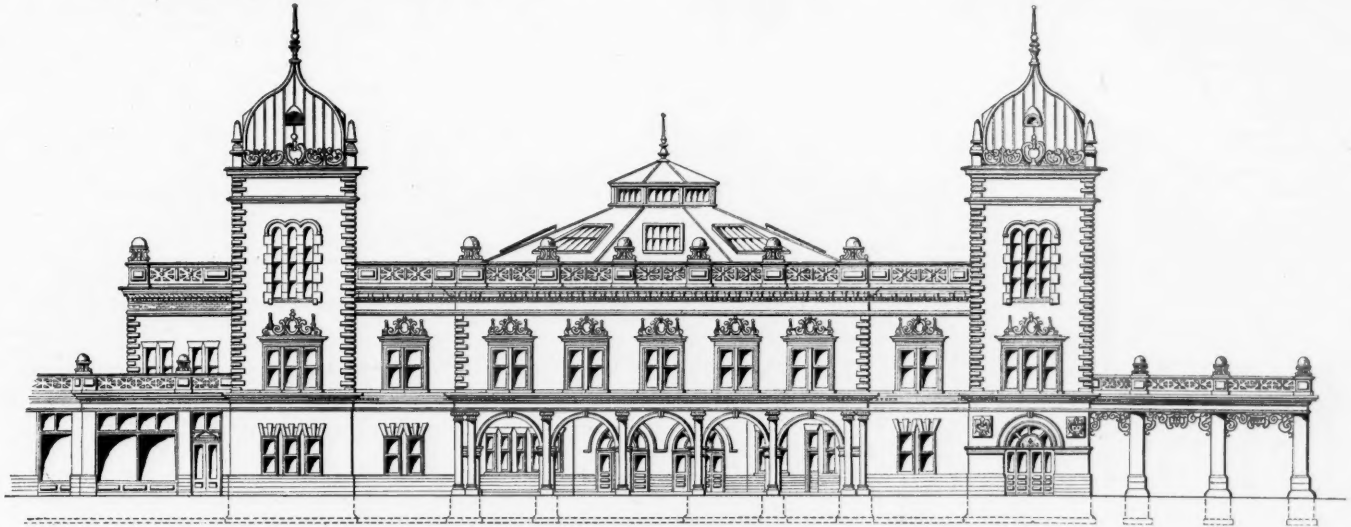
The property is protected against fire by a very complete water system. Pipes supply hydrants located at short intervals on all parts of the property. Ordinarily these pipes are filled with pure artesian well water, abundant in supply for all ordinary purposes. This is kept under sufficient pressure by a small electric motor which acts automatically according to the demands. When a hydrant is tapped a large motor is immediately

The new station is to be on West Broad street, between Stewart and Roberts streets and a short distance south of the Central of Georgia station. At Central Junction four miles west of the new station the tracks of the Seaboard Air-Line and the Plant System come together and a double track is to connect the Junction with the station. The Seaboard line from Montgomery connects with this double track at Alabama Junction, about $2\frac{1}{2}$ miles out, and its line from Florida at Florida Junction, about $1\frac{1}{4}$ miles from the station. This double track to Central Junction will also be used by the Plant and Southern trains going to and from the north. The Plant System tracks approaching the city from the south will be met at Southover Junction about three miles from the new station. The connecting line will be about two miles long, leaving the double track about a mile from the station.

in supplying current to 130 Nernst lamps at 220 volts, and partly in operating numerous Westinghouse induction motors used in stationary service.

The small gas-engine generating set is used for exciting the large alternating current generator, for lighting the switchboard, and for charging the storage sparking outfits for both gas engines. It is used also for operating the motor-generator outfit and for lighting four large electric signs, two of which are placed over the main entrances of the Electricity Building. The switchboard for controlling these generators is equipped with the latest type of measuring instruments, switches, circuit breakers and auxiliary apparatus.

A 375 k.w. alternator, revolving field type, 7,200 alternations, is of particular interest. There is a complete set of the company's O. D. transformers from $\frac{1}{4}$ to 50 kilowatt; two sizes of Manhole type transformers, and two



West Broad Street Elevation—Union Passenger Station, Savannah, Ga.

set in motion taking water from the river and increasing the pressure and water supply to the required flow.

The freight yards of the Seaboard Air-Line lie west of the city near where the lines from the north, west and south meet. From the west end of these yards there is a line direct to the Hutchinson Island terminals, crossing the Savannah River by bridge over Mars Island and running along the center of Hutchinson Island to a distributing point at the rear of the terminals.

For passengers the Seaboard Air-Line is using the station of the Central of Georgia on the west side of

The principal feature in the approaches is the building of a bank across the low rice fields on that side of the city, Savannah being on high ground compared with the adjacent country. This bank will be 4,000 ft. long and of an average height of 25 ft. W. J. Oliver & Co., who have the contract, will build a temporary trestle over this portion. The material for the embankment, amounting to 350,000 cu. yds., will be obtained on the proposed line near Southover Junction and the work will be done with steam shovels and trains.

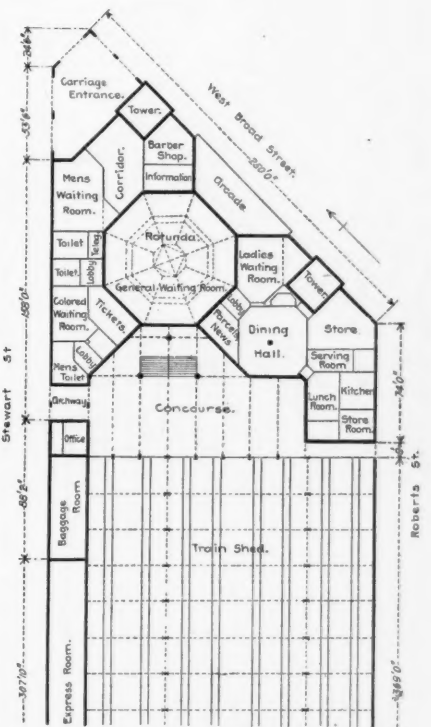
All grade crossings within the city have been eliminated by overhead bridges. Adjacent to the station yard will be the coach storage and cleaning yard, the turntable, coal bin, water station and a shop for light repairs. The tracks in the yard, shed and main lines will aggregate 13 miles and will be laid with 70-lb. rails. The station fronts on West Broad street and is designed by Frank P. Milburn, architect, Columbia, S. C. It will be of brick with steel frame. The exterior is of light-colored mottled pressed brick with granite base and terra cotta trimmings.

The unique feature of the station is an octagonal-shaped general waiting room, 80 ft. in diameter, located in the center of the building. It extends the entire height and is covered by a rotunda with glass. A gallery surrounds it on the second floor. From this general room open waiting rooms for white and colored women, men's smoking room, ticket offices, etc., and the dining room. In its center is a fountain. The floor is mosaic and the walls are finished in quartered oak. On the north, or Stewart street side, are the baggage and express rooms extending the entire length of the main shed. This shed is 396 ft. long with umbrella sheds extending 200 ft. further. It is to be built of steel and is expected to be ready next year in time for the season's business. The plans call for the completion of the approaches by Jan. 1 next.

Westinghouse Exhibits at the Pan-American.

The several Westinghouse companies have united in a joint exhibit at Buffalo. These companies are the Westinghouse Air Brake Company, the Westinghouse Machine Company, the Westinghouse Electric & Manufacturing Company, Westinghouse, Church, Kerr & Company, the Union Switch & Signal Company, and the Sawyer-Man Electric Company. The space which they occupy beneath the central dome of the Electricity Building and to the right and left of the main entrance to the Railroad Building amounts to over 6,000 sq. ft. The dome of the Electricity Building is tastefully draped with hanging green and lavender bunting, making a background upon which numerous strings of Nernst lamps festoon off from a large 2,000 candle-power lamp placed in the center. There are over a hundred 400 candle-power Nernst lamps.

There are in the Electricity Building two generating sets run by gas engines. The large unit consists of a 300 h.p. three-cylinder, four-cycle gas engine, direct-coupled to a 2,200-volt, two-phase, revolving-field alternator. The smaller unit is a three-cylinder, four-cycle gas engine, direct-connected to a 125-volt, direct-current generator. The power furnished by the large unit is employed partly



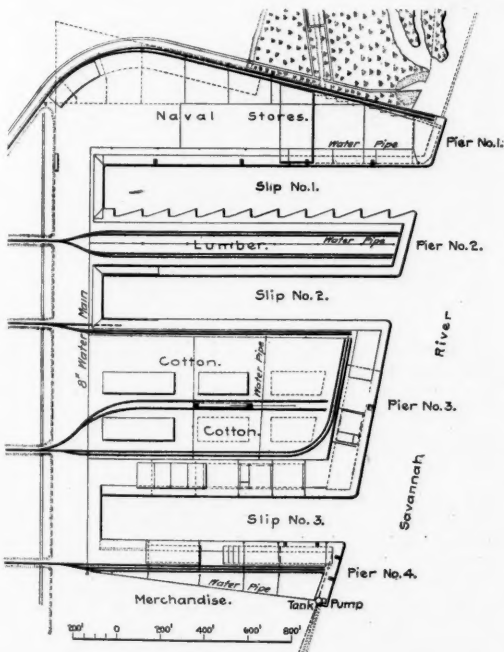
Plan of Savannah Union Station.

100 kilowatt self-cooling, oil insulated transformers. The latter are used to lower the voltage of the 180 k.w. machine from 2,200 to 110 volts, at which potential they supply the four incandescent signs.

One of the most novel attractions in the Electricity Building is a high voltage sign. It consists of two large glass plates covered on the back with metal foil, with the name "Westinghouse" in its center. An alternating pressure having a maximum of 40,000 volts is applied between the foil on the back and the metal letters on the front. As the potential is raised a fringe of violet light appears about the letters which, gradually increasing in intensity, culminates in a myriad branched lightning discharge that plays continuously over the surface of the plate and is accompanied by a continuous crash not unlike thunder.

Among the railroad motors are a Westinghouse 56 motor for heavy suburban and interurban service, a 50-C, for heavy railroad service, and a 69 motor for city and suburban service. These motors are split horizontally with their suspension on the lower half of the field. There is also a large number of type "C" induction motors adaptable where constant speed is required, and of variable speed type "F" motors. The company also exhibits motors, lightning arresters, fuse blocks, switches, circuit breakers, etc.

The Railway Exhibits Building contains all flanged wheel exhibits. In the Southeast end of this building is



Seaboard Air Line Terminal on Hutchinson Island.

the city. Building is in progress on approaches for a union station which is to accommodate all passenger trains entering the city except those of the Central of Georgia. These are the Seaboard Air-Line, the Plant System and the Southern. The present Plant station is on the east side of the city not far from that company's terminals, and is also used by the Southern. The Savannah Union Station Company was organized some months ago and its officers represent the three companies interested. W. W. Mackall, its President, is the General Counsel of the Seaboard Air-Line. F. S. Gannon, Vice-President, is the Third Vice-President of the Southern. The Plant System is represented by J. Moultrie Lee, Treasurer, and by T. S. Tutwiler, Chief Engineer of the Station Company. J. H. McKenzie & Sons, of Augusta, were recently awarded the contract for building the union station.

the exhibit of the Westinghouse Air Brake Company. In a rack representing a six-car train, with locomotive, is a high-speed brake equipment. An attendant operates and explains it. Each part is duplicated and cut in section, and connected in tandem to its corresponding active part, so as to show every movement. The action of the 9½-in. air pump is shown in this way.

Four motor-driven duplex air compressors are part of this exhibit. These are adapted to supply air for brakes on electric vehicles as well as other industrial uses. A complete equipment of both the straight air and the storage system of air-brakes for electric cars is so arranged on a platform as to show their application to the car.

The American Automatic Slack Adjuster, shown with the high-speed brake, is also shown on a model engine truck; also on a model locomotive frame with three pairs of drivers connected, and a complete equipment for a passenger car.

The Westinghouse Friction Draft Gear is shown mounted on full-size models of draft rigging, illustrating its application to different forms of cars, both wooden and pressed steel. Full size apparatus is shown cut open. The Westinghouse electric brake and car-heating apparatus is shown in full operation. This has recently been described in the *Railroad Gazette*.

A standard single truck electric car is in constant service on a track extending from the main exhibit in the Railway Exhibits Building to a point east of the building, some 250 ft.; and a double truck of the maximum traction type equipped with two 40 h.p. motors and with the electric brake, is operated on a short section of track by a stationary controller. This equipment shows the enormous braking power of the apparatus and

In connection with the Westinghouse exhibits it is worthy of note that in the city of Buffalo and vicinity the Westinghouse Electric & Mfg. Co. has over 150,000 h.p. of electrical machinery in operation, including the ten 5,000 h.p. generators installed at Niagara Falls, at a time when the largest electrical machine built was about 2,000 h.p. in capacity. It is this installation that has made possible the most brilliantly lighted of expositions and contributed so largely to its success.

Broken Suspension Rods on Brooklyn Bridge.

The recent discovery of some broken suspension rods and bands on the New York and Brooklyn Bridge is now a matter of common knowledge. That the date and the hour of this discovery should so closely coincide with the time of the bridge trouble in 1898 is odd, but beyond this coincidence of time there is no parallel in the two events, except that both occurred after a protracted term of unusual heat. The buckling of truss chords in 1898 was on July 29, at 6:20 in the evening, during a complete blockade of the south roadway from the New York side to a point 200 ft. west of the Brooklyn tower. The discovery of the broken suspension rods which has given some recent public concern was on Wednesday of last week, July 24, shortly after 6 o'clock in the evening, and was made in the ordinary course of bridge surveillance. All railroad and street car traffic was suspended for an hour or two, but the bridge was not closed to pedestrians and teams. A little later in the evening a "shuttle train"

These cast-steel trunnion blocks are 5¼ in. deep, the rods passing through them freely, and a nut was placed beneath the block to hold the whole in place.

"Examination shows that all of the broken rods are broken in these blocks and entirely out of sight; until enough of them had been broken to allow the cable to lift or the floor to settle sufficient for the broken ends of the rods to come into sight nothing would be known of the break. An examination of the fracture of two of the rods indicates unmistakably that they have been broken for a long time. All of the remaining suspender rods on this cable and on the other three cables have been carefully re-examined, and they are in perfect order.

"As to the broken cable bands, there are 1,760 of them around the cables on the bridge, and it is quite possible notwithstanding the rigid inspection to which they were subjected before they were put in place, that occasionally a defective band may have been used. Constant inspection since the bridge has been in use has detected a few, and these have been replaced without in any way affecting the strength of the bridge or impeding traffic.

"In my judgment, the cause of the present breaking of several of the suspender rods is as follows: As I have said before, two of the broken rods show old breaks—one much older than the other—as indicated by the broken ends of the rods. One rod having broken, would throw additional strains on those adjoining it, and in the course of time these would give way, and the process would naturally continue unless the broken rods were replaced.

"The fact that the rods on all of the other cables are sound would seem to indicate that my theory is correct, and that the fact that one rod in all respects like all of



New York and Brooklyn Bridge—Looking Toward New York.
The arrows indicate the location of the nine broken suspenders.

the absolute freedom from skidding of the wheels. The smooth action of this brake is one of its chief features.

The Westinghouse automatic air and steam coupler is shown. This has no locks, catches or other parts which require manipulation by the train men. In coupling it is only necessary to push the cars together and when uncoupling to pull them apart. It is unnecessary for trainmen to go between the cars, and arrangements are provided for opening and closing, from the side of the car or the platform, the cocks in the train pipes.

A pictorial representation of the development of the power brake from the earliest forms of hand brakes is an interesting feature of the brake exhibit. These pictures are arranged chronologically.

The space occupied by the Union Switch & Signal Company is just west of the Air Brake Company's exhibit. Electro-pneumatic, interlocking and signaling, the "wireless" system of automatic electric block signaling, and the high-speed electric train staff are shown.

The electro-pneumatic is illustrated by a two-lever section of the latest pattern of machine, a double arm iron post signal, a dwarf signal, and a switch-and-lock movement working a switch with detector bar. Sections of some of the principal parts are also displayed.

The working on the wireless automatic is shown on a model track 50 ft. long, traversed by a model engine. There are two electric, style B, semaphore signals, a single and double arm. These are operated automatically from the model track. The exhibit includes semaphore mechanisms and motors, battery chutes, relay boxes, cranks, wheels, jars, etc. Two of the electric train staff instruments are connected and working. Not the least interesting feature is the collection of photographs and drawings, including a view of the new and greatly enlarged works at Swissvale.

service was started on the south roadway and continued through Thursday. Repairs were made during Thursday night under the direction of Chief Engineer C. C. Martin and traffic of all kinds was fully resumed at 6 o'clock Friday morning.

This is the whole occurrence, in so far as public service was affected, and the official report of Mr. Martin to Commissioner of Bridges John L. Shea, clearly states the nature and extent of the defects. The report follows:

"Around the cables are placed steel cable bands which are 5 in. wide and ½ in. thick. These are placed at a horizontal distance of 7½ ft. apart. Connected to these, near the center of the main span of the bridge, on each cable, are 2½ in. steel suspension rods; all of the other suspenders on the main span are made of steel wire ropes 1¼ in. in diam.

"The object of these suspender rods and ropes is to connect the transverse girders of the floor system of the bridge to the cables, which ultimately carry the weight of the bridge with its load.

"On Wednesday afternoon, July 24, it was discovered that seven of these suspension rods and two cable bands were broken, and traffic on the north half of the bridge was suspended. On account of the expansion and contraction of the trusses of the bridge, there is a longitudinal maximum movement at the slip joints of about 7 in., and as this movement takes place in the truss, to which the floor beams and the lower ends of the suspender rods are attached, and does not occur in the cable to which the upper ends of these rods are attached, the result is that the lower ends of the rods move backward and forward as the truss expands or contracts.

"In order to provide for this a steel trunnion block was introduced into this connection, which permitted a rolling motion without producing cross strains in the rods.

the others so far as can be seen, broke long in advance of the others, or that it broke at all, would seem to indicate that it was originally defective.

"The bridge is now in perfect working order and is entirely safe."

The foregoing covers the occurrence from the view point of Chief Engineer Martin, who further says: "So long as the trolley cars are kept at intervals of 102 ft. and the railroad cars at an interval of not less than 45 seconds headway the bridge is absolutely safe and the public need have no apprehension."

We give herewith some illustrations with further information in detail relating to the parts of the bridge that gave trouble. Fig. 1 shows a perspective view of the bridge, looking from the north and the Brooklyn shore. The part of the river span where the rods broke is indicated by the arrows shown near the middle of the bridge. Fig. 2 shows the two steel suspension rods nearest the expansion joint of the river span, one east and one west of the expansion joint, and their attachments to the north cable, on which all the breaks were found (cable A in the bridge construction records). The trunnion blocks and their bearings and the extreme movement of trusses and suspension rods in expansion and contraction are also there shown, the movement of rods and trusses being indicated by dotted lines.

Fig. 3 shows the several parts of a trunnion and its connections, and the lower end of a suspension rod as it was removed after the defects in the bridge were found. Among the views in this illustration is a cross section showing the gradual manner in which the rods broke, the fracture indicating a slow advance from the exterior of the rod to the middle section, as in repeated bending in a given plane. The roughened surfaces of the trunnions and trunnion bearings show some metal seizure

from friction at those points and establish a resulting interference with the free rotation of the trunnions. All breaks in the rods were within the body of the trunnion blocks.

The trunnions and their bearings are cast steel and are not machine finished. The trunnion blocks are from $5\frac{1}{4}$ in. to $5\frac{1}{2}$ in. deep on the line of the suspension rod;

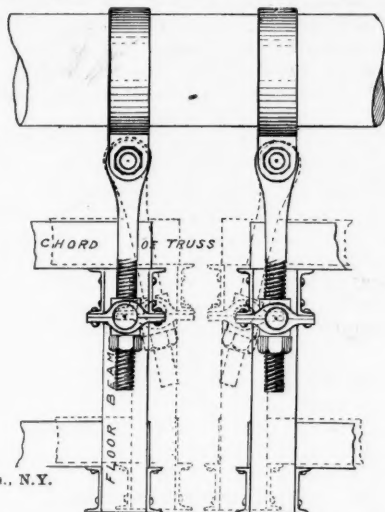
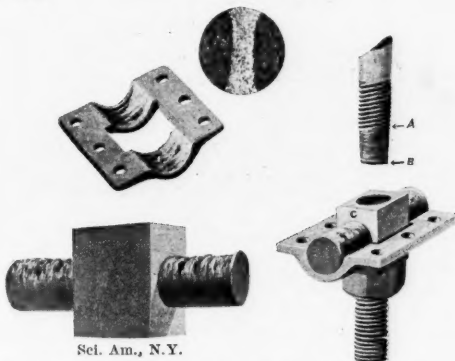


Fig. 2.—Suspension Rods and Extent of Movement at Middle Expansion Joint.

the portion through which the rod passes is 4 in. x 4 in. in plan view; the trunnions are $3\frac{1}{2}$ in. diam., and the length from end to end of trunnions on the line of the bearings is 10 in. The cast-steel plates that form the trunnion bearings are 10 in. x 10 in. x $\frac{3}{4}$ in.

As stated by Mr. Martin, there were nine breaks in all, seven rods and two cable bands. The rods and bands, in their relation to the structure as a whole, were broken as follows: East of the central expansion joint, rod No. 1, an old break complete; No. 2 the same; No. 3 a complete break, 85 per cent. of which was old; No. 4 a complete break, 50 per cent. of which was old; No. 5 a complete new break; No. 6 a broken cable band, the break being entirely new. West of the expansion joint, rod No. 1, an old break complete; No. 2 a ragged break complete, hard to estimate the time, but showing gradual breaking; No. 3 a band newly broken, complete. It is noticeable that the extreme break at the end of the series of breaks on each side of the expansion joint was in a cable band and not in the suspension rod. The cable bands are 1 in. thick where they are bent into lugs to receive the "eye" end of the suspension rods under the cable, and they are gradually tapered in thickness to $\frac{1}{2}$ in. on the top of the cable, the width being 5 in. Both breaks in the cable bands were in the thick section just above the bend of the lugs.



A-B—Part of a broken rod that was hidden by trunnion block. C—A cast-steel trunnion block in position.

Fig. 3.—A Broken Suspension Rod With Trunnion Block and Bearings.

From what has been stated it is seen that a considerable portion of the north side of the bridge floor was temporarily deprived of a part of its normal support, not abruptly or with violent manifestations, but by the gradual failure of a few of the many rods that are put in action by the combined movement of the bridge members. Speaking of the general question of safety of the structure Mr. Martin's view has been given above. We add an extract from a letter written by Mr. Washington A. Roebbling to the *Railroad Gazette* in 1898 and published Nov. 25 (page 841), that year:

"But the crying evil on the bridge is that, every year since it has been opened to traffic, there have been numerous additions to the dead load, small in themselves, but large in the aggregate. They amount to fully 15 per cent., if not more, all of which must be multiplied by a factor of tension of 1.70, and is intensified by being carried chiefly by the two middle cables. They comprise, for example, telegraph cables and wires, pneumatic tubes, double lines of rails, fastenings, sheaves and ropes, trolley wires with extra heavy supporting brackets, heavy rails for trolley cars, heavier planking, electric light stands, etc., etc.

"The climax of overloading was reached when the trolley took possession of the roadways and began to run in defiance of all stipulation, as regards weight of cars or distances apart. I can readily believe that the incident of a horse dying on the track caused a blockade

of cars, which increased the live load from two to even three times what it was fixed at originally. Similar blockades on a smaller scale have happened before, and the bottom chords have buckled before, and, in all probability, will again.

"It has been charged that but for my acquiescence the trolley would never have gained a foothold on the bridge. But where is the man who ever succeeded in preventing a trolley from going where it wanted? The prospective advantages, both from a pecuniary view as well as in the increase of transit facilities, were so enormous that no power, barring the actual collapse of the structure, could have kept them off. I had thought that with full regulating powers vested in the bridge authorities we might run the risk, and in that I was mistaken.

"What is needed at present is a recalculation of the loads and weights of the bridge, so as to determine the present margin of safety in the main parts of the structure, such as cables, anchorages, etc. Application to this effect has been made to the proper authorities by me, without any satisfactory result as yet.

"I have no fear of the cables. They still have ample strength, and could pull up the anchorages with ease.

"After such investigation we can determine whether it is advisable to lighten the structure and relieve it of at least a small portion of the load, which is constantly being added to, even now. To reinforce the cables would be a difficult, if not impossible, task. The anchorages can be reinforced."

The day following the discovery of the breaks in the bridge, when thousands of people crossed the river on ferryboats because of more or less definite fears of the safety of the bridge and distrust of the assertions of the officials that the bridge was safe, the District Attorney of New York, Mr. Philbin, announced that he should refer the facts of the accident to the Grand Jury, to see if there should not be a criminal prosecution of one or more of the city officials who have charge of the bridge; and a day or two later Mr. Philbin announced that he had appointed Mr. Edwin Duryea, an engineer, of 166 Cumberland street, Brooklyn, to make a detailed examination of the bridge for the purpose of aiding the District Attorney in his decision. Mr. Duryea expects to make a thorough examination of the structure, which will occupy several weeks' time. He was formerly connected with the East River Bridge Commission.

The district attorney appears to have been incited to this action by the severe criticisms of the newspapers concerning the methods of care and inspection in force in the department of the city government which has charge of the bridge. The reporters of the principal daily papers questioned all of the chief officers of the department who should be cognizant of the regulations which govern its work, but could get no definite or satisfactory replies as to the frequency or regularity of inspections or the qualifications of the inspectors.

Train Accidents in the United States in June.

COLLISIONS.

Rear.

1st, 2 a. m., on Pennsylvania road, near Bellwood, Pa., a circus train, moving very slowly, near F I tower, was run into at the rear by a following circus train, and a caboose, two passenger cars and several freight cars were badly damaged; one employee of the circus was injured. There was a dense fog at the time.

3d, on Pennsylvania Lines, near Powhatan, Ohio, a work train, which had stopped to set off some cars, was run into at the rear by a following work train, and the caboose of the foremost train was wrecked. Two workmen in the caboose were killed and six were injured. There was a dense fog at the time.

3d, 11 p. m., on Pittsburgh, Chicago & St. Louis, at Pittsburgh, Pa., an eastbound passenger train, consisting of a locomotive and three cars, collided in the tunnel at Try street, with the rear car of a preceding freight train, which had broken away and had been left by its train. This car was an oil tank, and the tank being punctured, fire immediately started, and the passengers and trainmen had to flee quickly to the rear to avoid suffocation. None of the cars was derailed, and the oil car was soon pulled out of the tunnel where, after a few minutes, it exploded. The firemen of the city saved the surrounding buildings from destruction. The combustible portion of the passenger train was burned up. One passenger was injured in the collision, but he, and all the others, escaped the fire. This collision was reported in the *Railroad Gazette*, June 21.

5th, 3 a. m., on Burlington, Cedar Rapids & Northern, near Epley, Iowa, passenger train No. 6 ran into a stock car which had been blown from a siding to the main track, and the engine was overturned. The fireman was killed and the engineer and one postal clerk were injured.

5th, 10 p. m., on Yazoo & Mississippi Valley, at Lyon, Miss., passenger train No. 5 ran into the rear of a preceding freight train, and the engine, caboose and two freight cars were badly damaged. The engineer was injured. When an engine and engineer had been procured to take the place of those disabled, the train proceeded; and, the next morning, at Floweree, Miss., collided with northbound passenger train No. 4, as reported below.

6th, on Pittsburgh, Cincinnati, Chicago & St. Louis, near Alpha, Ohio, a freight train broke in two and the rear portion afterward ran into the forward one, damaging several cars, including a tank car of oil, which exploded and set fire to the rest of the train, including two cars of coke. A brakeman was injured.

8th, 10 p. m., on Delaware, Lackawanna & Western, at Vestal, N. Y., freight train No. 61, standing at the station taking water, was run into at the rear by a following freight, and the caboose and several cars were crushed. The car next to the caboose contained dynamite, which exploded, wrecking four cars and damaging the windows in many buildings, some of them several miles away. The shock was felt at a distance of 30 miles. Five trainmen were killed. A number of dwelling houses and barns within a radius of half a mile were damaged. It appears that there was a view of the tail lights of the standing train for a mile or more in the

rear, but that the engineman did not properly control his speed.

9th, on Cleveland, Akron & Columbus, near Mount Vernon, Ohio, a freight train which had been unexpectedly stopped was run into at the rear by a following passenger train, damaging the engine and derailling three freight cars. It is said that a brakeman had gone back with a flag from the freight to signal the passenger, but that he was overcome by an epileptic fit and was unable to display his flag.

9th, on Chesapeake & Ohio, near Richmond, Va., 16 cars of a freight train broke away and were left standing in a tunnel, where they were run into at the rear by a following freight; two trainmen injured.

9th, on Erie road near Hornellsville, N. Y., a freight train broke in two and the rear portion afterward ran into the forward one; one brakeman killed, conductor injured.

11th, on Norfolk & Western, near Suffolk, Va., a freight train ran over a misplaced switch and into the rear of another freight; engineman and fireman injured.

14th, on Chicago, Rock Island & Pacific, at Ainsworth, Iowa, a freight train standing at the station was run into at the rear by a following freight, and eight cars were wrecked. The station building was badly damaged. The fireman was injured. It is said that the collision was due to a misunderstanding of orders.

17th, on Illinois Central, at Canton, Miss., a freight train ran into the rear of a preceding freight, damaging the caboose and several cars. A brakeman in the caboose was killed.

22d, on Baltimore & Ohio, at Hyndman, Md., a freight train ran into the rear of a preceding freight, derailling the engine and wrecking 12 cars. The engineman was injured.

24th, on Great Northern, near White Earth, N. D., passenger train No. 3 collided with a freight car which had been blown out of a side track to the main line, and the engine and two cars were damaged. A tramp stealing a ride was killed and another was injured.

26th, on Baltimore & Ohio, near Cowen, W. Va., rear collision of freight trains; one engineman injured.

28th on New York, New Haven & Hartford, near Rowayton, Conn., a freight train broke in two, and the rear portion afterward ran into the forward one, wrecking three cars. A brakeman was injured.

And 16 others on 12 roads, involving 4 passengers and 21 freight and other trains.

Butting.

6th, 8 a. m., on Yazoo & Mississippi Valley, at Floweree, Miss., butting collision of passenger trains, 5 and 4, due apparently to misunderstanding or neglect of orders on the part of the southbound train, which was about six hours late. Three engines and one baggage car were wrecked and eight trainmen and five passengers were injured.

8th, on Cleveland, Cincinnati, Chicago & St. Louis, near Jonesboro, Ind., butting collision between southbound passenger train No. 25 and northbound passenger train No. 26, badly damaging both engines. It is said that the northbound train ran past the appointed meeting place, the engineman intending to back into the siding instead of entering it at the nearest end. Three passengers and one trainman were injured.

10th, 4 a. m., on Louisville & Nashville near Colesburg, Ky., butting collision between a northbound bound freight engine and a southbound passenger train; seven trainmen injured. It is said that the engineman of the freight engine made a mistake in reading the time.

12th, on Eastern Minnesota, near Superior, Wis., butting collision between a passenger train and a switching engine; one passenger injured.

12th, on St. Louis, Iron Mountain & Southern, near Forrest City, Ark., butting collision between passenger train 101 and freight train 106, wrecking both engines and several cars. Several trainmen were injured.

13th, on Atchison, Topeka & Santa Fe, near Williams, Ariz., butting collision between an eastbound passenger train and a westbound freight, the latter drawn by two engines. Two firemen were killed and four other trainmen were injured.

13th, 10 p. m., on Pennsylvania road, at East Aurora, N. Y., butting collision between a southbound passenger and a northbound freight train, damaging the engine and four cars. Several passengers were slightly injured.

15th, on Pittsburgh & Western, near Glenshaw, Pa., butting collision between a passenger train and a freight in a tunnel, damaging the engines and several freight cars. The passenger conductor was injured.

18th, on Kansas City Southern, near Grandview, Mo., butting collision between a passenger train and an empty engine; five trainmen injured.

20th, on New York Central & Hudson River, at Buffalo, N. Y., butting collision between an empty engine and a Grand Trunk passenger train; one fireman killed.

22d, on Missouri Pacific, at Butler, Mo., butting collision of freight trains, badly damaging both engines and several cars. Three trainmen were injured, two of them fatally. It is said that the engineman of the southbound train had fallen asleep in the cab.

28th, on Ohio Central, at Peoria, Ohio, butting collision of freight trains; two trainmen injured. It is said that one of the trains encroached upon the time of the other without sending out a flag.

And 6 others on 5 roads, involving 3 passenger and 9 freight and other trains.

Crossing and Miscellaneous.

3d, on Southern Pacific, at Bealville, Cal., a passenger train of the Atchison, Topeka & Santa Fe collided with a switching engine of the Southern Pacific, derailling both engines. One engineman was injured.

4th, on Southern Railway, near Atlanta, Ga., a switching engine on a side track was backed into the side of a passenger train passing on the adjacent main track at full speed, wrecking the sides of two passenger cars. The switching engine was moved without authority by a yard conductor who, to get it out of his way, entered the cab during the absence of the hostler, intending to move the engine a short distance, from one side track to another. But the engine was much larger than any which he had ever handled before, and after he had started he found himself unable to control its speed. Three passengers were killed and 20 passengers, one employee and one other person were injured.

8th, on Southern Railway, at Peyton, Ga., collision between a passenger train and a freight; one fireman injured.

9th, 2 a. m., on New York Central & Hudson River, at Herkimer, N. Y., eastbound parcel express train No. 31 collided with a switching freight train, and one engine and two express cars were badly damaged; one engineman injured. It is said that the collision was due to a misplaced switch.

13th, on Chicago, Rock Island & Pacific, near Walnut, Iowa, collision between a freight train and a work train; one engineman injured.

(Continued on page 550.)



ESTABLISHED IN APRIL, 1856.
PUBLISHED EVERY FRIDAY
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

We have taken occasion several times to call attention to the fact that those electric railroads which run cars at high speed on long stretches of single track are bound, by their duty to the public, to pay careful heed to various lessons concerning safety which may be learned by a study of the experience of steam railroads for the past 65 years; and repeated examples of heedlessness of apparently one and the same kind, in different places, have brought the subject up again and again. The butting collision near Greenbush, N. Y., in May (reported July 12, p. 503, and July 26, p. 532) serves to emphasize still another point, to wit, that to put a fast running car in charge of a single motorman is not only to incur all the risks or responsibilities which are connected with ordinary railroading, but is going farther; for the motorman has no monitor, whereas the steam engine runner has his fireman. The importance of utilizing the fireman as a check on the engineman in observing signals and remembering special orders, has received increasing appreciation during the past 10 years; but it must be said that these are the same 10 years in which, in the electric railroad field, the need of having any monitor at all has been increasingly denied—if we may judge by the practice. It is true that on the electric car the conductor may partly fill the place that the fireman fills on a locomotive. Rules usually require him to do all in his power to promote safety and often, perhaps generally, he can have an eye ahead and can keep time schedules and telegraphic orders constantly in mind. But this is a dangerous dependence. As with the steam railroad rules which are designed to place equal responsibility on both engineman and conductor, much must be left to the conductor's discretion. No superintendent will go so far as to say that he must watch out for every point that the engineman watches out for. If the conductor is to collect fares and look out for the passengers' safety (as affected by their behavior and movements in the car or cars) he cannot be depended on to keep an eye constantly out ahead. This last function must be made secondary to his other duties; and if it is secondary we must not depend upon it. We shall not find fault with the New York Railroad Commissioners' opinion that the conductor in the Greenbush case could and ought to have seen that his car stopped at the meeting point, for we do not know enough of the circumstances to assert that he had good excuse, or any excuse, for not being on the watch; but this does not affect our main point. The aim of the superintendent must be to prescribe a rule of universal application. Even to require the conductor to give a bell signal on approaching meeting points is imposing on him a considerable respon-

sibility if he happens to have a carload of troublesome passengers when he is behind time. Certainly he deserves the best possible provisions in the way of distant signals or other landmarks, so that the duty of knowing when he is approaching a station shall take the least possible amount of his attention. His case calls for more attention on the part of the superintendent than does that of the passenger conductor on the standard railroad, for the latter has a brakeman whose assistance he can command.

To recommend that the cares of the conductor be lightened implies that those of the man at the front of the car will remain unrelieved. In this connection it is somewhat surprising that the report of the New York Railroad Commissioners, in the case under consideration, makes no mention of the coroner's finding that the railroad company failed to exercise reasonable care in the selection of its men. Coroners' reports are not usually noted for their technical wisdom, and we do not mean to magnify the importance of this one; but the general tenor of its recommendations was such as to at least justify some attention to this matter of the examination of candidates for the position of motorman. If a company does not even examine a man's eyesight, one may readily believe that the more difficult questions of experience, habits, good judgment, quick wittedness, and correct working-habits may have been neglected. If the coroner is entitled to any respect whatever, the Commissioners should either confirm his view or give reasons for dissenting from it. A man who, with no assistance except that of a conductor who has other duties which take most of his attention, is to regulate the speed of a car full of passengers running from 30 to 50 miles an hour, over a road full of grades and curves, should have the very best quality of mental equipment. If any electric railroad superintendent thinks that he can fill this requirement only by hiring express enginemen at five dollars a day, and therefore fears that the expense will thwart him, he may be reassured; for plenty of suitable men are available, as is apparent from a study of the motormen in New York, Boston and Chicago. Not all of these men have had experience at high speeds, but their capabilities have been tried by other tests, so that there can be no doubt that competent men are available at reasonable wages. Proper attention to the physical, mental and moral condition of prospective employees and to their training, if they need training, certainly cannot be less important than getting conductors' and motormen's signatures to telegraphic orders. Moreover, the general question of the qualification of employees has direct connection with this particular case; whereas the failure to use "31" orders was not one of the causes of this collision. It is, perhaps, proper to add that the more the circumstances of this and other butting collisions on electric lines are looked into, the more do the weaknesses of the despatching system appear, and the stronger do we find the argument for using only the space-interval on such lines.

Brake Shoes.

The substance of the M. C. B. report on brake shoes was given in our issue of June 28, and this report should be read in connection with the discussion printed July 5, as a number of doubtful points in the report were cleared up at the meeting. While this report has been discussed at some length in our correspondence columns there are a few things of general interest which have not been mentioned and to which it seems desirable to draw attention.

In the first place the committee, in presenting the report before the convention, modified its requirements for friction, as shown by tests on the M. C. B. brake shoe testing machine at Purdue. For tests on chilled wheels at initial speeds of 40 miles an hour the mean coefficient of friction is to be 22 per cent. under a braking pressure of 2,808 lbs.; 20 per cent. under 4,152 lbs. pressure, and 16 per cent. under 6,850 lbs. pressure. This is for chilled wheels. For steel-tired wheels the initial test speed taken is 65 miles an hour and the requirements are 16 per cent., mean coefficient, at 2,808 lbs. braking pressure; 14 per cent. at 4,152 lbs., and 12 per cent. at 6,850 lbs. braking pressure. By reference to the diagrams, p. 255 of the M. C. B. Proceedings for 1896, it will be seen that these figures are those of the "B" brake shoes tested at that time, which are ordinary plain cast-iron shoes without chill.

It has long been conceded that, under present conditions, the friction of plain cast iron is what is needed. The amount of the whole thing is that the

air brake apparatus has been proportioned to suit the friction of this class of brake shoes, and with the present brakes, any metal shoe having much higher frictional qualities than ordinary plain cast iron is undesirable on account of the greater liability to skidding wheels. A shoe with much lower frictional qualities reduces the efficiency of the brakes and, other things being equal, a longer distance is required in order to stop trains. Hence, it will readily be seen that the committee could do little more than indorse what has heretofore been considered the proper friction for brake shoes.

The adoption of the committee's recommendation as a standard will probably in itself bring about no great change. For the last five years at least the frictional qualities of ordinary cast iron have been accepted as most suitable for brake shoes, and yet very few roads, if any, are to-day using that class of shoes. The great majority of roads are buying brake shoes solely on a basis of wearing qualities and it is doubtful if the Association, endorsing what has long been considered the standard of friction, will affect an important improvement in this condition. It is going to take time to educate everybody up to using more efficient brake shoes and this action can only be considered a beginning.

The idea evidently prevailed at the convention that the brake-shoe makers are responsible for the use of very hard brake shoes with a consequent low coefficient of friction. This is far from true. For instance one speaker said, "What I am afraid of with our friends who are introducing brake shoes is that they will forget that one of the very important functions of a brake shoe is to stop a train." Now, as a matter of fact the railroads are solely responsible for the use of these hard brake shoes and they have really forced the makers into furnishing them. The great majority of roads will buy only the shoes which wear longest, whereas on the other hand it is plainly to the interest of the brake-shoe maker to furnish soft shoes which will wear out quickly, and so increase the demand. It has happened several times in the last few years that new brake shoes have been put on the market, in the form of combinations of soft and chilled iron, and invariably when new at the business an attempt is made to reproduce the frictional qualities of ordinary cast iron. Then we have noted with a good deal of interest how in the course of a few months the area of chilled iron in the shoe is increased, simply because railroads demand long life to the exclusion of all other qualities. Reference to the tests reported this year shows how wide is the range of friction between different combinations of soft and chilled iron brake shoes, and in this the particular trade name of the brake shoe is immaterial. That is, any of a number of makers can easily supply composite brake shoes with high frictional qualities, if railroads will buy them.

While the committee called its recommendation as to friction a specification, yet it is not a specification in the ordinary sense. For instance, it cannot be used in buying brake shoes. In buying brake shoes as things now stand, it would be out of the question to attempt to specify that the coefficient of friction should meet the M. C. B. requirements. The difficulty alone of making friction tests would preclude their being bought under such a specification. Possibly a satisfactory specification for brake shoes will yet be made, at least for the composite cast-iron shoes, by specifying the proportion of chilled to soft iron surface in the face of the shoe for a given design; further to specify that the shoe show a given strength on a drop test, and that the fracture have defined characteristics. Several makers now judge the qualities of their shoes in the foundry by the appearance of the fracture and the blow required to break the shoe, and there would seem to be a possibility of roughly determining the relation between the coefficient of friction and the physical qualities of cast-iron brake shoes which could be made the basis of a specification. Until something of that kind is worked out there can be no practical check on the brake-shoe maker. We still seem to be a long way from a specification for brake shoes.

June Accidents.

Our record of train accidents in June, given in this number, includes 81 collisions, 126 derailments and 4 other accidents, a total of 211 accidents, in which 67 persons were killed and 241 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

| | Rear. | Crossing | | Total. |
|--|-------|---------------|--------|--------|
| | | But- ting. | other. | |
| Trains breaking in two..... | 6 | 0 | 0 | 6 |
| Misplaced switch..... | 1 | 1 | 4 | 6 |
| Failure to give or observe signal..... | 2 | 1 | 2 | 5 |
| Mistake in giving or understanding orders..... | 1 | 3 | 0 | 4 |
| Miscellaneous..... | 10 | 2 | 7 | 19 |
| Unexplained..... | 13 | 11 | 17 | 41 |
| Totals..... | 33 | 18 | 30 | 81 |

Derailments.

| | | | |
|-----------------------|----|------------------------------|-----|
| Broken rail..... | 2 | Bad switching..... | 1 |
| Defective bridge..... | 2 | Careless running..... | 1 |
| Defective switch..... | 2 | Runaway..... | 2 |
| Broken wheel..... | 5 | Animals on track..... | 3 |
| Broken axle..... | 12 | Washout..... | 3 |
| Broken truck..... | 3 | Malignous obstruction..... | 3 |
| Brake hose burst..... | 2 | Accidental obstruction..... | 8 |
| Broken car..... | 2 | Fall of earth in tunnel..... | 1 |
| Misplaced switch..... | 8 | Unexplained..... | 61 |
| Derailing switch..... | 1 | | |
| Trackmen..... | 3 | Total..... | 126 |
| Bad loading..... | 1 | | |

Other Accidents.

| | |
|-----------------------|---|
| Boiler explosion..... | 2 |
| Broken side rod..... | 1 |
| Other causes..... | 1 |
| Totals..... | 4 |

Total number of accidents..... 211

A general classification shows:

| | Collisions. | Derailments. | Other acc'ts. | Total. | P. c. |
|------------------------------|-------------|--------------|---------------|--------|-------|
| Defects of road..... | 6 | 0 | 6 | 12 | 5.7 |
| Defects of equipment..... | 6 | 24 | 4 | 34 | 16.1 |
| Negligence in operating..... | 34 | 17 | 0 | 51 | 24.2 |
| Unforeseen obstructions..... | 0 | 18 | 0 | 18 | 8.5 |
| Unexplained..... | 41 | 61 | 0 | 102 | 48.3 |
| Totals..... | 81 | 126 | 4 | 211 | 100 |

The casualties may be divided as follows:

| | Collisions. | Derailments. | Other acc'ts. | Total. |
|-----------------|-------------|--------------|---------------|--------|
| Killed: | | | | |
| Employees..... | 21 | 19 | 4 | 44 |
| Passengers..... | 3 | 16 | 0 | 19 |
| Others..... | 1 | 3 | 0 | 4 |
| Totals..... | 25 | 38 | 4 | 67 |
| Injured: | | | | |
| Employees..... | 69 | 55 | 2 | 126 |
| Passengers..... | 39 | 72 | 0 | 111 |
| Others..... | 2 | 2 | 0 | 4 |
| Totals..... | 110 | 129 | 2 | 241 |

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

| | Pass. killed. | Pass. injured. | Emp. killed. | Emp. injured. |
|--|---------------|----------------|--------------|---------------|
| Defects of road..... | 0 | 3 | 0 | 1 |
| Defects of equipment..... | 0 | 12 | 6 | 2 |
| Negligence in operating..... | 3 | 54 | 26 | 76 |
| Unforeseen obstructions and malfeasance..... | 16 | 29 | 2 | 13 |
| Unexplained..... | 0 | 13 | 10 | 34 |
| Totals..... | 19 | 111 | 44 | 126 |

Thirty-three accidents caused the death of one or more persons each, and 48 caused injury but not death, leaving 130 (62 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with June of the previous five years shows:

| | 1901. | 1900. | 1899. | 1898. | 1897. | 1896. |
|------------------------|-------|-------|-------|-------|-------|-------|
| Collisions..... | 81 | 84 | 100 | 52 | 40 | 49 |
| Derailments..... | 126 | 119 | 115 | 88 | 52 | 49 |
| Other accidents..... | 4 | 9 | 5 | 6 | 3 | 5 |
| Total accidents..... | 211 | 212 | 220 | 146 | 95 | 103 |
| Employees killed..... | 44 | 50 | 15 | 21 | 32 | 14 |
| Others killed..... | 23 | 30 | 4 | 7 | 13 | 16 |
| Employees injured..... | 126 | 92 | 73 | 67 | 47 | 37 |
| Others injured..... | 115 | 97 | 102 | 64 | 80 | 19 |
| Average per day: | | | | | | |
| Killed..... | 7.03 | 7.07 | 7.33 | 4.87 | 3.17 | 3.13 |
| Injured..... | 2.23 | 2.66 | 6.33 | 0.93 | 1.50 | 1.00 |
| Average per accident: | 8.03 | 6.30 | 5.83 | 4.37 | 4.23 | 1.53 |
| Killed..... | 0.32 | 0.38 | 0.08 | 0.19 | 0.47 | 0.32 |
| Injured..... | 1.14 | 0.89 | 0.79 | 0.90 | 1.33 | 0.60 |

Passengers were killed in two bad accidents this month, bringing the record in this respect nearly up to the disastrous record of the same month a year ago, when occurred the McDonough (Ga.) disaster, killing 32 persons. The number of passengers killed in that month was 23.

Most of the worst accidents in the present record have already been made the subjects of items in our news or editorial columns. We recount them in the order in which they appear in the present record. (1) Rear collision in tunnel at Pittsburgh, 3rd; (2) rear collision of freight trains, 8th, at Vestal, N. Y.; (3) engine in collision with passenger train at Atlanta, 4th, three passengers killed; (4) passenger train thrown down a bank by misplaced switch at Monaca, Pa., 24th; (5) passenger train wrecked by washout at Cass, Ind., 26th, 16 persons killed; (6) wreck of tunnel at Baltimore, 29th.

Other notable accidents in the record are the rear collision near Mount Vernon, Ohio, on the 9th, reported as due to the failure of a flagman to stop a train in consequence of his being overcome by epilepsy; wreck of passenger train at Severy, Kan., on the 8th; wreck of passenger train on the 16th near Rockingham, N. C.

It will be noticed that of the butting collisions reported in the present list, the first 10 all involved passenger trains.

The newspapers reported 14 electric car accidents in June, in which six persons were killed and 48 injured. In one of the cases, a runaway on a descending grade, it is said that an attempt was made to prevent the street car from running into a railroad train by opening a derailing switch, provided for that purpose, but that the derail was out of order and therefore could not be opened.

The French chambers in November, 1899, passed laws limiting the hours of work of enginemen and firemen and other trainmen so that an increase in the number employed amounting to more than 6 per cent. has been necessary; recently further limitations of hours, which would

require about \$10,000,000 a year for additional employees, and increases of pensions amounting to \$4,800,000 more, have been proposed in bills, which the upper house has refused to pass, limiting the changes to such as will impose additional expenditures of two or three millions. The disposition to grant the employees all they ask for is very strong; but it is checked by the fact that the government guarantees dividends, and for most of the companies has to make advances every year on that account. For these companies every increase of expenses on account of the proposed laws would increase by so much the state's advances and the burdens of the tax-payers, which are already about as heavy as they can bear.

The decision of the Appellate Division of the Supreme Court of New York on the ticket scalping law was reported in these columns last week. The fuller accounts, received since, give little additional information, the main argument of Judge McLennan, who writes the present decision, being that the law is exactly like that of 1897 in unjustly depriving the common citizen of his right to engage in the business of ticket brokerage. The judge says that the proposition that a railroad ticket is not property has no authority to support it. The judge appears to admit that one clause in the law, that forbidding a general passenger agent to supply tickets to brokers to be sold is not in conflict with the constitution, but he does not allow this part of the law to stand. To the lay mind it would seem that parts of a statute which are constitutional ought not to go down simply because they are connected to other parts which are unsound. The decision seems to hold that this one provision, though salutary, is not, by itself, of enough consequence to entitle it to much consideration. For our part we think that this was one of the best features of the law, though it is true, of course, that with this, as with all anti-scalping statutes, the test comes when the attempt is made to enforce the law. The most regrettable aspect of the matter—one which is manifest throughout all the anti-scalping legislation and all of the discussions in the newspapers and elsewhere concerning the subject, is to see that the railroads are attempting to accomplish by statute that which ought to be accomplished by the railroads' own efforts. As Judge McLennan, in the present case, remarks, a railroad might reasonably make all its tickets non-transferable and thus go a long way toward killing out the brokerage business; but they do not do it; or, if they do it, they do not enforce the condition when it comes to dealing with tricky passengers. It is very difficult and costly to detect and thwart the scalpers (and passengers) who are willing to forge signatures; but it seems quite plain that the New York courts are determined to compel the railroads to take that course if they desire to stop the forgeries. It is not, perhaps, to be wondered at that the courts take this position. It is the natural attitude of a lawyer's mind. And as long as a good share of the traveling public and a large share of the legal fraternity love to fight railroads as well as they love to eat, it is likely that an anti-ticket-brokerage law would be pretty hard to enforce, however satisfactory its terms might be. But the proposition to forbid a railroad to sell tickets except through recognized agents and at publicly advertised offices is a specific proposition which anyone can understand. No reputable railroad officer can object to such a requirement. The law could require railroads to report the names of all persons to whom commissions or salaries are paid. Why not press for a law embodying that feature alone, and see what comes of it? Not all of the fraudulent ticket business would be suppressed by such a law, however successful it might be; but one important branch would be called to account.

The Cultural Value of Engineering Education.

BY FRANK O. MARVIN.*

What is culture? . . . There is something subtle and emotional about it that eludes a close pursuit. The reason for this perhaps lies in its essential individual quality, in its being the result of a personal life, developed, it is true, on lines similar to those used in other lives, yet including something that pertains exclusively to a human unit that is different from all other units.

Nevertheless, there seem to be certain fundamental qualities which must be possessed before a man can be classed with cultured people, qualities which are only acquired after a considerable experience in life, but which are influenced greatly by the years of student training, and therefore fit subjects for discussion here.

The man of culture must be a thinking and reflecting being. There must be not only the ability but the habit, and this is no easy thing to acquire. . . . In the popular opinion, the men who act quickly, the men of decision, are those who succeed. But there is a danger here. For, back of the action, behind the sharp decision, must lie a mature judgment, and how else is this to be formed except as a result of deliberate reflection. However quickly one may reach a conclusion, its correctness or faultiness will depend not on intuition but on the degree of true comprehension. . . . The early steps of this training are necessarily slow, and we, as teachers of engineers, must recognize this and not yield to the temptation to crowd our students over too much ground on the

*Professor in the University of Kansas, retiring President of the Society for the Promotion of Engineering Education. Extracts from the presidential address at the Buffalo meeting.

one hand, or on the other to lead them through short cuts that may give them ease and quickness of travel but little or no reason why the path is chosen. Let them go the long road. I do not by any means wish our teaching to be non-practical—rather more practical in the best sense; but first, last and all the time, let students be trained to do their own thinking and to form their own judgments; to test the statements of others by the workings of their own mental processes. There is another element of culture that comes in here, an ethical one, that of forming right judgments. Men may have the appearance of culture without its true spirit, which is essentially honest. This is especially important as culture seeks to make a man's life satisfactory to himself when measured by his own conscience as well as successful in the field of affairs. So his standards must be based on sound principles of right and wrong. . . .

There can be no true culture for a man who does not work, who does not put his cultivated powers to some useful service; and here there must be such degree of mastery over the chosen profession or business as will result in a special skill and dexterity—a doing of some one thing better than others can do it. . . . Here in early years the engineering student has the advantage of the student in arts. Study for knowledge's sake may be stimulating to the few, but for the many there is needed the goal of a special calling to secure the close application that results in ability to concentrate one's energy to the attainment of a certain end. But here again comes a danger, that of too early or overspecialization. . . . All one-sided people, whether they be linguists or naturalists, poets or merchants, preachers or engineers, are liable to the forming of erroneous judgments. To the few geniuses, whose capacities and powers seem to be abnormally developed, though of limited scope, much is forgiven; but for the average man of the day there is demanded an ability to form good and wise conclusions.

In order to form those that are appropriate and correct there is needed breadth of view; a quality that has been expressed by the word poise. A man of poise, of even balance, will see things in their right relations and due proportions. . . . This demands a considerable range of knowledge. Not the close mastery of many lines in all their details, but a fair degree of familiarity with their general phenomena and principles; and there is scarcely any field that will not contribute something to the result. . . .

It is a fair question whether in our desire to graduate students that can be early useful we do not place too much stress on technical things to the exclusion of others that give greater breadth of training. We must not forget that we are educating men for a life. . . . Engineers must manage men and matters of finance.

It is not sufficient to form correct judgments only; there must be added a skilful and effective presentation of them in well chosen and fitting English. The ability to do this involves more than training in the writing of compositions, themes, forensics and reports. The cultured man should have a taste for reading the best that has been written in his mother tongue. . . .

To the writer's mind, there is another element of culture that should enter into an engineer's training, viz.: an appreciation for beauty. The engineer is a designer, and it is important that he should embody his design in artistic form if he is to fulfill his whole mission. . . .

The possession of agreeable manners and tact is another evidence of culture. . . . Manners are not to be taught from a text or by lecture; they rather follow as a consequence from the whole course of training, and are crude or refined, just as the character of the instruction makes them. The teacher's personality has very much to do with this matter. . . .

And now for the real question—does engineering education tend to produce culture? . . . No one existing course of educational training has a monopoly of cultural methods; nor will the completion of any college course necessarily secure its attainment because of its personal quality. Further, culture is the result of a life, and the most that can be expected of a college course is to open the student's eyes to its real worth, to start him rightly with certain leanings and aptitudes. It is maintained that an engineering course can tend in this direction, and that in some of our best colleges, under the instruction of people themselves cultured, it does so tend to-day. Our best engineering courses are stiffer and more exacting both as to time and effort than those in the college of arts, and the resulting acquisition of mental power and the ability to focus it proportionately greater.

The fixed course, with its correlated parts and the certain definite end to be strived for are advantageous. The training is a continuous testing and trying of the truth of knowledge, and teaches the student to ask "why" and to reflect. He gains respect for nature's laws, and learns that his professional success will depend on his ability to work in harmony with her. He gathers a fair degree of knowledge of himself, his strong points as well as his limitations. He acquires a habit of thought and action that leads to further growth. He learns how to adapt means to an end, and within what limits of precision to work that it may be reached with economy. In short, he becomes a trained and educated man, cultured to a certain degree, but with limitations; just as the arts student who has specialized to a like degree in language and literature, with little of science training, becomes cultured, but also with limitations. Let the latter retain his A. B. On the other hand, let it be recognized that the engineering B. S. stands for culture

as well, of equal worth and value though of different kind. As between the two specialists, I think the advantage lies with the engineering graduate as being on the whole better equipped for a life of useful service and one that will possess the greater capacity for further development.

As one looks forward . . . he must see that the profession will be doing a larger work and exerting a greater influence. Further, that an engineering training will be more and more recognized as the one best fitted to lead to positions of an executive nature in connection with industrial enterprises, and in the administration of public works. Everywhere will be demanded expert skill, sound judgment and broad views, primarily because these will be found to be economical. . . .

There are two tendencies in the present day engineering education that are, in my judgment, opposed to the desirable result. First, a tendency to crowd too much of the foundation work back upon the preparatory school, already overloaded. . . . Second, the allowing of technical subjects to crowd the fundamental general ones from the college course, in a vain attempt to do what from the very nature of the case can not be done, make an engineer by college study. The result of this in some institutions is further seen in too early a differentiation between the various engineering courses; so that, for instance, the civil student knows nothing of applied electricity and the electrical nothing of surveying, while neither has a chance to acquire a taste for literature. . . . The Chief Justice of my own state has said: "The spirit of an age is that which makes finally for the happiness of the race. I have absolutely no fear as to the final end of things, nor as to the steps and incidents of evolutionary development. The aspirations, the great universal possessions of a people, can never move them to other ends than their happiness and good. The spirit of this age is commercial enterprise and conquest, and as to it I have an unspeakable conviction that it will, as the spirits of other ages have done, work itself into forms and institutions of beauty and eternal worth to man." It is largely through the engineer that this is to be done. The finest result requires the most skillful labor; the noblest workman demands the most fitting training.

Train Accidents in the United States in June.

(Continued from page 547.)

14th, on Pittsburgh, Ft. Wayne & Chicago, at Rochester, Pa., an eastbound passenger train backing from one main track to another was run into at the rear end by a following freight train; one passenger injured.

14th, on Pennsylvania Lines, at Marion, Ind., a passenger train ran over a misplaced switch and collided with a switching engine, badly damaging both engines. One fireman was badly injured.

15th, 4 a. m., on Philadelphia & Reading, at Paxtang, Pa., a freight train collided with a string of eight freight cars which had escaped control at Rutherford and had run several miles on the main track. The engine and many freight cars were badly wrecked. One brakeman was killed.

15th, on Southern Railway, at Rapidan, Va., collision between a freight train of the Southern and one of the Chesapeake & Ohio, wrecking both engines and several cars. Two trainmen were killed and one injured. It is said that the Southern train approached the station, which was the appointed meeting point for these trains, at uncontrollable speed.

16th, on Southern Pacific, near Napa, Cal., a passenger train collided with some freight cars, wrecking three of them. Three passengers and one trainman were injured. It is said that the collision was due to a misplaced switch.

18th, on Southern Pacific, near San Jose, Cal., collision between a passenger train and an empty engine; one engine man injured.

18th on Pennsylvania road, at South 25th street, Pittsburgh, collision between a freight train and some empty freight cars standing on the main track, wrecking two engines and three cars. Two brakemen were injured.

26th, at Bladen, Ga., a freight train of the Seaboard Air Line ran into a freight of the Brunswick & Western at the crossing of the two roads. The fireman of the S. A. L. was killed and the engine man injured.

29th, at Ridgeville, Ind., a passenger train of the Pittsburgh, Cincinnati, Chicago & St. Louis ran into a passenger train of the Grand Rapids & Indiana, damaging one engine and one car. Two passengers were injured.

And 16 others on 14 roads, involving 3 passenger and 28 freight and other trains.

DERAILMENTS.

Defects of Roadway.

8th, 2 a. m., on Union Pacific at Como, Wyo., an eastbound passenger train was derailed by a broken rail and two sleeping cars were ditched. A tramp was injured.

16th, 10 p. m., on Seaboard Air Line, near Rockingham, N. C., a passenger train broke through a trestle bridge which had been weakened by a flood, and three passenger cars fell into a pond. Several passengers were injured. The baggage man, though badly hurt, went back with a lantern and stopped a following freight train.

20th, on Mobile & Ohio, near Churchula, Miss., a freight train broke through a trestle bridge which had been weakened by fire, and the engine and 14 cars were wrecked. A brakeman was injured.

And 3 others on 3 roads, involving 1 passenger train and 2 freight trains.

Defects of Equipment.

20th, on Pennsylvania road, near Greenville, Pa., a passenger train was derailed by the breaking of an axle of the locomotive, and four cars were overturned. Twelve passengers were injured, most of them slightly.

25th, on Northern Pacific, near Glendive, Mont., a freight train was derailed by a broken truck, and 10 cars fell down a bank. A tramp stealing a ride was killed.

26th, on Alabama Great Southern, near Powderly, Ala., a freight train was derailed by a broken wheel and eight cars were wrecked. A brakeman was killed.

28th, on Chicago, Rock Island & Pacific, near Verdi, Iowa, a car in a freight train broke down and, with nine other cars, was ditched and wrecked. A brakeman was killed.

And 20 others on 16 roads, involving 4 passenger and 16 freight and other trains.

Negligence in Operating.

2d, on Colorado & Southern, near Boreas, Colo., a freight train, consisting of an engine and 14 cars loaded with ore became uncontrollable on a steep grade, and after running some distance was derailed and wrecked. One brakeman was killed.

4th, on New York Central & Hudson River, at Macedon, N. Y., a freight train was derailed at a misplaced switch; engine man and fireman killed, and two other employees injured.

5th, on Louisville & Nashville, at South Tunnel, Tenn., a freight train switching in the yard was derailed by a misplaced switch, and a brakeman was injured.

12th, on Burlington, Cedar Rapids & Northern, near Estherville, Iowa, a passenger train broke through a bridge which was undergoing repairs; engine man and fireman slightly injured.

24th, on Pittsburgh & Lake Erie, near Monaca, Pa., passenger train No. 23 was derailed at a misplaced switch, and the entire train fell down a bank, the passenger cars being overturned. The fireman and baggage man were killed and 15 passengers and two trainmen were injured.

And 12 others on 10 roads, involving 4 passenger and 8 freight trains.

Unforeseen Obstructions.

5th, on Texas & New Orleans, near Athens, Tex., a work train running backward was derailed by an obstruction, said to be malicious, and five platform cars were ditched. One employee was killed and four were injured.

8th, on Dunkirk, Allegheny Valley & Pittsburgh, near Fredonia, N. Y., passenger train No. 4 was derailed by a stone, and the engine fell down a bank. The engine man was killed.

12th, on Chicago, Milwaukee & St. Paul, near Geddes, S. D., a passenger train was derailed by running over some cattle; one brakeman injured.

18th, on Lehigh Valley, at Parkview, N. J., the locomotive of a freight train, while switching in the yard, was derailed by running over a turtle.

25th, on St. Louis, Iron Mountain & Southern, near Beebe, Ark., a passenger train was derailed by running over a cow, and the mail car was overturned and wrecked. Three mail clerks and one passenger were injured.

26th, 1 a. m., on Wabash road, near Cass, Ind., westbound passenger train No. 3 was derailed at a washout, and the cars fell down a bank, making a very bad wreck. The express car and first passenger car appear to have fallen first. The sleeping car lodged on the top of the wreck, and was not badly broken. Sixteen passengers were killed and 25 passengers and 3 trainmen were injured. This accident was reported in the *Railroad Gazette* of July 12, p. 505.

29th, 1 a. m., on West Jersey & Seashore, near Millville, N. J., a freight train was derailed and wrecked by running into a derrick which was being used in repair work. The engine man was injured.

29th, 2 a. m., on Philadelphia, Wilmington & Baltimore, at Baltimore, Md., the second section of northbound passenger train No. 78 was derailed, in the tunnel north of the station, by earth which had fallen from above the roof. A large quantity of earth fell on an express car, crushing it. The tunnel was blocked for 10 days. The accident was reported in the *Railroad Gazette* of July 12, p. 505.

was derailed and eight cars were wrecked. A brakeman was injured.

15th, on Baltimore & Ohio, near Benwood Junction, W. Va., a freight train was derailed. One employee riding on the train off duty was killed.

16th, 11 p. m., on Erie road, near Jamestown, N. Y., a freight train was derailed and many cars were damaged. One trainman was killed.

17th, on Southern Pacific, near Carlin, Nev., an empty engine was derailed and the engine man was injured.

19th on Norfolk & Western, near Tazewell, Va., a work train was derailed and wrecked, and two kitchen cars and several other cars took fire and were burned up. Two employees were killed and five were injured.

19th, on Southern Pacific, near Colmesneil, Tex., a freight train was derailed and two cars and the caboose broke through a bridge and were wrecked. A brakeman was injured.

20th, on Wisconsin Central, near Milladore, Wis., the caboose of a freight train was derailed, and the conductor and one brakeman were injured, the conductor probably fatally.

24th, on Great Northern, at White Earth, N. Dak., a passenger train was derailed; two tramps were killed and several passengers were injured.

20th, on Charleston & Western Carolina, near Roebuck, S. C., a passenger train was derailed and six trainmen were injured.

20th, on Dry Fork Railroad, near Hendricks, W. Va., a work train was derailed on a bridge, and the engine and two cars fell off and were wrecked. The Master Carpenter of the road, the fireman and one other employee were killed and 12 employees were injured.

22d, on Central of New Jersey, at Jersey City, N. J., an eastbound passenger train was derailed near signal tower No. 1 and the engine was overturned. The engine man was killed.

24th, on Baltimore & Ohio, at Broad Tree, W. Va., a freight train was derailed, and the engine and several cars were ditched. A fireman was killed and a tramp injured.

29th, on Illinois Central, near Lyle, Iowa, a car in a freight train was derailed on a bridge and, with six other cars and the caboose, fell to the river 20 ft. below. The conductor and one brakeman were injured.

And 44 others on 34 roads, involving 10 passenger and 34 freight and other trains.

OTHER ACCIDENTS.

5th, on Atlantic Coast Line, near Nashville, N. C., the locomotive of a freight train was wrecked by the explosion of its boiler and several cars were badly damaged. The engine man was killed and two other employees were injured.

9th, 8 p. m., on Atlantic Coast Line, near Jarratt, Va., a sleeping car in a passenger train was set afire by the explosion of a lamp, and was totally destroyed.

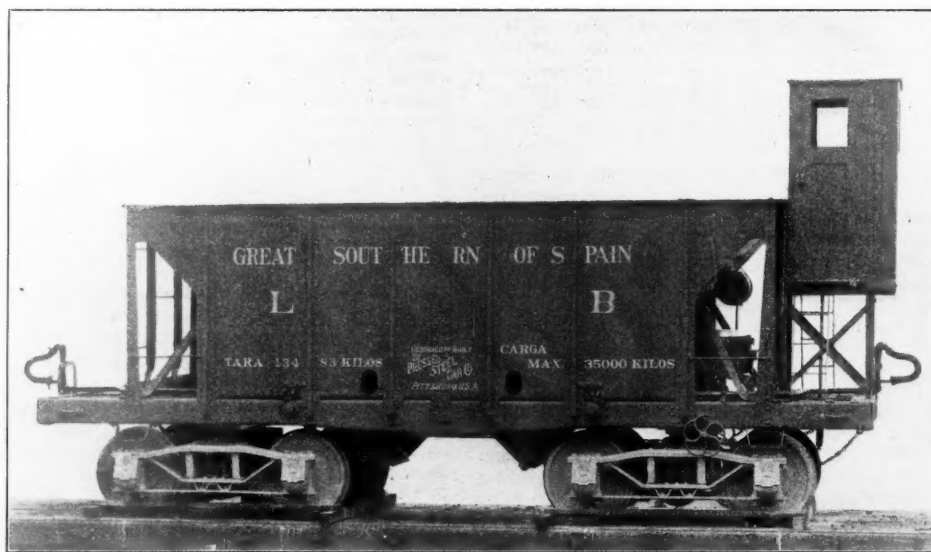
13th, 2 a. m., on Union Pacific, near Clark's, Neb., the locomotive of a freight train was wrecked by the explosion of its boiler, and several cars were badly damaged. The engine man and fireman were killed and a brakeman was fatally injured.

And 1 other, involving 1 passenger train.

A summary will be found in another column.

40-Ton Pressed Steel Cars for the Great Southern of Spain.

The Pressed Steel Car Company has just sent to Aquiles, in Southern Spain, 70 large capacity pressed steel hopper ore cars for the Great Southern of Spain Railroad. The cars, packed in parts, were sent



Pressed Steel Car for the Great Southern of Spain (5 ft. 6 in. Gage).

29th, on Pennsylvania road, near Greensburg, Pa., westbound passenger train No. 21 was derailed at a switch which, it is believed, had been maliciously misplaced, and four sleeping cars were ditched. Only three persons (all passengers) were seriously hurt.

And 9 others on 9 roads, involving 3 passenger and 7 freight and other trains.

Unexplained.

8th, on St. Louis & San Francisco, near Severy, Kan., a passenger train was derailed and one sleeping car and one dining car took fire and were burned up. Ten passengers were injured, two of them fatally.

9th, on Pittsburgh & Western, at Youngstown, Ohio, a freight train was derailed and the engine man was injured.

9th, on St. Louis Southwestern, near Pine Bluff, Ark., a freight train was derailed on a trestle bridge and 15 cars fell down a bank. A brakeman was injured.

13th, on Southern Pacific, near Felton, Cal., the engine and baggage car of a passenger train were derailed, and the engine man and fireman were injured.

15th, on Illinois Central, at Minonk, Ill., a freight train

on the White Star Line steamer "Georgic," from New York, July 23. An engineer from the Pressed Steel Car Company will superintend the erection of the cars on their arrival in Spain.

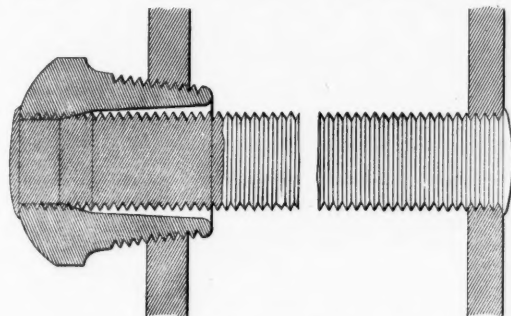
The cars are of 80,000 lbs. capacity, and will be the largest in use on any Spanish railroad. One car in ten is equipped with a shelter box for the brakeman or guard. This arrangement is shown in the accompanying illustration from a photograph. The shelter boxes are built of wood on the end of the car and the guard has an unobstructed view of the portion of the train under his care. Other minor portions of the car, such as the hand brake apparatus, differ from American standards, but in the main the cars are similar to cars already built for ore roads in this country, by the Pressed Steel Car Co. The cars, when erected, will be 26 ft. 6 in. long, 8 ft. wide, with a height, from top of rail to top of body, of 9 ft. 9 1/2 in. The light weight is 29,180 lbs., and

the ratio of paying load to total weight of car when loaded 75.09 per cent. The gage of the Great Southern of Spain is 5 ft. 6 in.

This order for cars was secured by the Pressed Steel Car Company through its foreign agent, the Transportation Development Company, of London. This company also recently secured an order for 250 cars for use by the Government Railroads of Australia, in New South Wales, and the order has now been increased to 450 cars.

The Nixon Safety Staybolt Sleeve.

This device was patented by Mr. Joseph Nixon in 1893. Mr. Nixon was then General Foreman of the Pennsylvania Railroad boiler shops at Altoona. In 1896 the sleeve was tested in the famous vibrating machine at the laboratory at Altoona, and it was found that the bolts held by these sleeves withstood five times as many vibrations as common staybolts without the sleeves. The company then equipped 20 engines, and these were compared for 30 months with 20 engines fitted with ordinary staybolts. It was found that 547 of the old style bolts



The Nixon Safety Staybolt Sleeve.

had broken, while but 23 breaks had occurred on the 20 engines using the Nixon sleeve. The cost of renewing the 547 bolts was \$310, not counting the loss of service of the engines. The cost of renewing the 23 bolts was \$7.13. The result of this test was that the Pennsylvania in 1898 adopted the Nixon sleeve as standard. Up to Feb. 19 of this year 800 engines had been fitted and the company had used 320,000 sleeves; the Union Pacific Railroad Company had used 27,000.

The sleeve is made in malleable iron, and in case it breaks the crack is outside the boiler shell and the leak is detected. The sleeve then becomes a nut, and the sheets are stayed practically as safely as before the fracture.

In changing, the head of the sleeve is broken away from the bolt. The bolt is screwed a few threads through the inner plate, the riveted head is removed, and then the bolt is backed out through the shell. The fragments of the sleeve are then backed out and a new one put in its place.

The sleeve is tapered on the outside and tapped into the boiler shell and the staybolt is tapped into the sleeve. The bolt hole in the sleeve has parallel sides at the outer end for a length equal to half the diameter of the bolt. From there it tapers, the inner end finishing in the bell mouth, so that when it is tapped the thread is a declining one.

TECHNICAL.

Manufacturing and Business.

The Standard Coupler Co. has received an order for 25 Standard steel platforms from the Southern Pacific, which road is equipping a large number of cars with Standard steel platforms.

Frederick Brotherhood has been appointed Manager of the Foreign Sales Department of the Railroad Supply Co., with headquarters at its New York store, 106 Liberty street.

The Frazier Coupling Manufacturing Co., Peoria, Ill., has opened an office at 32 LaSalle street, Room 417, Chicago. The company is putting on the market a new device for coupling manila rope, wire rope or chain.

The Edna Smelting & Refining Co., Cincinnati, Ohio, has opened its new works at Cincinnati, and will make a specialty of heavy brass and phosphor-bronze castings for railroads. It will also make "Porteous Graphite" babbitt metal.

C. S. Hawley, General Eastern Agent of the Consolidated Car Heating Co., of Albany, has closed a contract with the Manhattan Elevated (New York City) for 21,600 electric car heaters to be applied to 1,200 cars. This is probably the largest single order ever placed for electric heaters.

A. C. Stites has resigned as Resident Engineer of The Phoenix Bridge and the Phoenix Iron Companies at Chicago, and on Aug. 1 commenced an engagement with Joseph T. Ryerson & Son, 18 Milwaukee avenue, Chicago, Ill. Mr. Ryerson opened the Chicago offices of The Phoenix Companies nine years ago and has been in charge ever since.

The Case Mfg. Co., of Columbus, Ohio, has recently received orders for nine electric traveling cranes, ranging from five to 15 tons capacity, and up to 69 ft. span and for four jib cranes up to 7½ tons capacity. The following is a list of the concerns to which the cranes were sold: Lake Superior Power Co., Sault Ste. Marie, Ont.; John H. McGow & Co., Cincinnati, Ohio; St. Louis

Transit Co., St. Louis, Mo.; J. H. Mann, Lewiston, Pa.; Block-Pollak Iron Co., Cincinnati, Ohio; Best Mfg. Co., Pittsburgh, Pa.; Hoeflinghoff & Lane Foundry Co., Cincinnati, Ohio; Erie City Iron Works, Erie, Pa.; U. Baird Machinery Co., Pittsburgh, Pa.; St. Louis Iron & Steel Foundry Co., St. Louis, Mo.; Humphreys Manufacturing Co., Mansfield, Ohio. The Case Co. has also received an order from the Wellman-Seaver Engineering Co., of Cleveland, Ohio, for three trolleys to be used on 75-ton Holden-Gantry cranes.

Iron and Steel.

The Old Dominion Iron & Nail Works, at Richmond, Va., has been sold to the Messrs. Williams, of Richmond.

Charles Calvin Briggs, a member of the Board of Managers of Jones & Laughlins, Ltd., Pittsburgh, died in that city July 19.

F. J. Llewellyn has been appointed Manager of the Gillette-Herzog plant of the American Bridge Co., at Minneapolis, succeeding William Gillette, who resigned Aug. 1.

The Commonwealth Steel Co. was incorporated in New Jersey last week, with a capital of \$1,000,000, by K. K. McLaren, Clifford W. Perkins and A. S. Meeker, all of Jersey City, N. J.

The Carnegie and Bethlehem Steel Companies have both made known to the Navy Department their willingness to enlarge their plants so that the government will receive 500 tons of armor a month from each concern, or an aggregate of 1,000 tons a month instead of 600 tons.

The Havana Dry Dock.

The Navy Department has bought from Spain the floating steel dry dock which has been lying so long in Havana harbor. The original price asked was \$250,000, but the purchase was finally made for \$185,000. Naval Constructor Gillmor, U. S. N., has gone to Havana with a force of men to prepare the dock to be towed to the naval station at Olongapo, P. I. If the locks of the Suez Canal will permit the dock will go that way, the total distance being 11,916 miles. If colliers are used for towing the cost will be about \$30,000.

The Transportation Jury at the Pan-American.

Last week, page 537, we printed the names of the members of the Jury of Awards, Transportation Division, Pan-American Exposition. It will probably have been noticed that the railroad branch of the art of transportation is not proportionately represented in the list of Jurors. We are glad to be able to announce that Mr. F. A. Delano, General Manager of the Chicago, Burlington & Quincy, consented at the urgent request of the Chairman to act on that Jury and this week visited Buffalo and reviewed the findings in the railroad group of the Transportation Division.

New Battleships.

The new battleship "Pennsylvania," the keel of which has been laid at the yards of the William Cramp Ship & Engine Building Co., at Philadelphia, will be one of the three largest ships now building for this country. She will have twin screws, 15,000 tons displacement and 18,000 i.h.p., with a speed second only to that of the new Russian cruiser, "Verlag." She will have 24 guns in her main battery.

The battleship "Maine" was launched last week from the same yards, and is about 56 per cent. finished. She is larger than the first ship of her name, and has twin screws, 12,500 tons displacement and 16,000 i.h.p. and will have 20 guns in her main battery.

The Electro-Pneumatic Brake Again.

For some time past Siemens & Halske have been experimenting on the Prussian Military Railroad with what may be called an electro-pneumatic brake, which is apparently a Westinghouse brake with an addition of electrical apparatus by which the air pressure may be applied instantly and simultaneously on every car. The brakes may be applied pneumatically, as heretofore. At a meeting of the German Society of Mechanical Engineers, a Mr. Wagner, an engineer, who has been observing these experiments, spoke in enthusiastic terms of the results obtained, saying that it made the pneumatic brake applicable on the longest trains entirely without shock, and either gently or in full force; that all the air in the cylinders is made available for braking; that the braking can be graduated at will, and that when brakes have been let off they can be applied again instantly, which is often very desirable in entering stations.

Interlocking Signal Law in Texas.

At Austin, Texas, on Tuesday of this week, the State Railroad Commissioners were to have a hearing on the new interlocking law of Texas under which the Commissioners are to prescribe and order interlocking signals and safety devices at grade crossings in that state. It appears that the law went into effect July 8; and, from the account before us, we judge that it gives the Commissioners extensive powers. It is expected that a general order will be issued requiring interlocking signals at all crossings over which a certain minimum number of trains passes daily. The law also gives the Commissioners authority to regulate the construction of new crossings. Where a new road is built across an old one the entire cost of signaling is to be borne by the new company. The *Galveston News* makes the somewhat surprising statement that only two interlocking plants are now in operation in Texas, one where the M., K. & T. and the Frisco cross the Red River, near Denison, and the other at the bridge across Galveston Bay, which is used by several different roads.

The Guayaquil & Quito.

Mr. J. P. McDonald, of the firm of J. P. McDonald Co., 35 Nassau street, New York City, who has the contract for building the Guayaquil & Quito Railway in Ecuador, has recently returned from a trip to that country. He says his firm will require at least 300,000 barrels of cement. They will also need a number of steam shovels, contractors' cars, wheel and drag scrapers and other tools. The railroad is being pushed on rapidly to completion. Work is now in progress on the plateau at an altitude of 11,000 ft. There are at work on the road 3,500 Jamaicans, 4,000 Serranos, or natives, and nearly 1,000 Americans, making in all about 8,500 men. This force is to be largely increased. The track is being laid at the rate of half a mile a day, while the grading of the road is kept 20 miles ahead of the laying of the rails. Trains are in operation between Guayaquil and Chimbo, 57 miles, and the contractor expects to have the entire railroad of 300 miles completed inside of 12 months. In our issue of July 26, p. 532, we gave a brief account of this railroad. Early last March we mentioned the contracts for rolling stock, bridges, etc., that have been let.

The Simplon Tunnel.

It is officially announced that the Simplon tunnel will be pierced during the year 1902. Naturally, the French Government and some of the French railroad companies are much interested in the matter of building a connecting line to unite the French roads with the northerly end of the tunnel. By a decree issued June 15 the Minister of Public Works, M. Baudin, has organized a commission, the duties of which are to study the best lines of connection to be built. This commission is composed of a number of Senators and Deputies, of various bureau officers of the Government, of the Presidents of the Chambers of Commerce of Paris, Lyons, Havre and Dunkirk, and of the following railroad officers: Arnaud, of the Paris, Lyons & Mediterranean; De Romilly, of the Eastern; Baume, of the Northern; Noblesme, of the Paris, Lyons & Mediterranean, and Sartiaux, of the Northern. The latter is Chief Engineer of Operation, his name being well known in this country; the others are "directors of control," a position corresponding in a general way with that of Auditor and Comptroller in this country.

Government Contracts and Army and Navy News.

The Allis-Chalmers Company, of Milwaukee, Wis., has been given the contract to furnish and erect complete the boilers and pumping machinery for the new sewerage pumping station at Washington, D. C., at its bid of \$253,000. (July 12, p. 506.)

The new battleship "Wisconsin" will be completed at the Puget Sound Naval Station, and the Navy Department has arranged with the builders, the Union Iron Works, of San Francisco, to deduct from the last payment on the ship an amount which will allow the work to be done in a Government yard.

The Ordnance Bureau of the War Department has let contracts for 490,000 lbs. of smokeless powder at 70 cents a pound. The contracts were divided among four factories, according to their capacity.

The fortifications around the harbor of San Francisco are to be greatly improved and the hills on both sides of the Golden Gate are to be mounted with the heaviest and most improved guns.

The Army Board of Ordnance and Fortifications has recommended that no more pneumatic dynamite guns be built, and the report having been approved by the Secretary of War, they will no longer be used for coast defense.

The first successful test of the new armor for the Navy, made after the Krupp method, was made recently at Indian Head. The plate was 6 in. thick and weighed 412 tons. Three shots were fired, the penetration being from 2¼ to 3 in., without cracking, and the plate was accepted as satisfactory.

Changes in the Corps of Engineers.

The following officers of the Corps of Engineers, U. S. A., have been assigned to duty as Division Engineers for engineering work, at the places named:

Col. Charles R. Suter, New York City, to the Northeast Division, which embraces the districts with headquarters at Portland, Me., Boston, Mass., Newport, R. I., and New London, Conn. Col. Samuel M. Mansfield, New York City, to the eastern division, which embraces the districts with headquarters at New York City, Oswego and Buffalo, N. Y., and Philadelphia, Pa. Col. Peter C. Hains, Baltimore, Md., to the southeast division, which includes the districts with headquarters at Baltimore, Washington, D. C., Norfolk, Va., Wilmington, N. C., Charleston, S. C., Savannah, Ga., and St. Augustine, Fla. Lieut. Col. Thomas H. Hanbury, Detroit, Mich., to the central division, embracing the districts having headquarters at Pittsburgh, Pa., Wheeling, W. Va., Cincinnati, Ohio, Louisville, Ky., and Chattanooga, Tenn. Lieut. Col. Oswald H. Ernst, Chicago, Ill., to the northwest division, which includes the districts with headquarters at Cleveland, Ohio, Detroit and Grand Rapids, Mich., Chicago and Rock Island, Ill., Milwaukee, Wis., St. Paul and Duluth, Minn. Col. Amos H. Stickney, St. Louis, Mo., to the western division, which includes the districts with headquarters at Nashville, Tenn., Little Rock, Ark., St. Louis, Mo., and Sioux City, Iowa. Lieut. Col. Henry M. Adams, New Orleans, La., to the gulf division, which embraces the districts with headquarters at Montgomery, Ala., New Orleans, La., Vicksburg, Miss., and Galveston, Texas. Col. Jared A. Smith, San Francisco, Cal., to the Pacific division, including

districts with headquarters at Seattle, Wash., Portland, Ore., San Francisco and Los Angeles, Cal.

Production of Iron Ore in 1900.

John Birkinbine has completed for the United States Geological Survey the statistics of the production of iron ore in the United States in 1900. The total was 27,553,161 gross tons, against a total in 1899 of 24,683,173 tons, showing an increase of 2,869,988 tons. The increase was almost wholly in Michigan and Minnesota. The following table shows the production in gross tons in some of the states:

| | 1899. | 1900. |
|--------------|-----------|-----------|
| Michigan | 9,146,157 | 9,926,727 |
| Minnesota | 8,161,289 | 9,834,399 |
| Alabama | 2,662,943 | 2,759,247 |
| Pennsylvania | 1,009,327 | 877,684 |
| Wisconsin | 579,798 | 746,105 |
| Colorado | 307,557 | 407,084 |
| New Jersey | 296,185 | 344,247 |

Iron and Steel Production for the Half Year.

The American Iron & Steel Association publishes statistics of the production of all kinds of pig iron in the United States in the first half of 1901; also complete statistics of the stocks of pig iron which were on hand on June 30. The total production of pig iron in 1901 was 7,674,613 gross tons, against 7,642,569 tons in the first half of 1900 and 6,146,673 tons in the second half. The increase in production in the first half of 1901 over the first half of 1900 was only 32,044 tons, but the increase over the second half of 1900 was 1,527,940 tons. Indications now point to a decreased production in the second half of 1901 as compared with the first half. The production of Bessemer pig in the first half of 1901 was 4,582,187 gross tons, against 4,461,391 tons in the first half of 1900 and 3,482,061 tons in the second half. The production of basic pig iron in the first half of 1901 was 645,105 gross tons, against 581,868 tons in the first half of 1900 and 490,508 tons in the second half.

The stocks which were unsold in the hands of manufacturers or their agents on June 30, 1901, amounted to 374,129 tons, against 442,370 tons on Dec. 31, 1900, and 338,053 tons on June 30, 1900.

THE SCRAP HEAP.

Notes.

The Railroad Young Men's Christian Associations at four points on the Union Pacific have each received gifts, from Miss Helen Gould, of music boxes playing 88 tunes, and orders for \$1,000 worth of books for their libraries.

A press despatch from Buffalo says that the Delaware, Lackawanna & Western has brought suit for injunctions against 60 ticket brokers of that city to restrain them from buying or selling excursion tickets issued by and used over that road.

The Corporation Commission of North Carolina has refused all applications for an order exempting street railroads from equipping their cars with vestibules. A recent law requires vestibules from Nov. 1 to April 15, the same to be provided on all cars, unless the Commission grants exemption.

Traffic Notes.

The Boston & Maine has appropriated \$6,000 toward a new building for the Young Men's Christian Association on Beverly street, Boston.

The officers of the Philadelphia, Wilmington & Baltimore estimate that the quantity of peaches to be shipped from points in Delaware and Maryland on and near their lines this year will be 2,293,200 baskets.

On the New York Central, bicycles are carried in baggage cars, within the State of New York, free, in accordance with the law; to points outside the State they are now checked, on payment of extra baggage at the rate of 6 per cent. of the ticket fare, which is equivalent to the charge on 50 lbs. of baggage. The minimum charge on any wheel thus checked is 25 cents.

Procuring legislative or judicial action from local courts and officials, as a means of heading off the ticket scalpers, appears to be growing in favor. The latest instance reported is at El Reno City, Okla. T., where the Chicago, Rock Island & Pacific secured the passage of an ordinance prescribing fine and imprisonment as punishment of any person buying or selling non-transferable railroad tickets which had been sold at reduced rates. The occasion was the large movement of people to that region on the opening of government lands to settlers. It is said that the Rock Island landed 16,000 persons in Oklahoma in one day.

The Seoul-Fusan Railroad.

The United States Consul at Seoul, Korea, reports that this road is to be built by a Japanese syndicate, upon a guaranty by the Japanese Government of the interest on the bonds for 15 years at the rate of 6 per cent. The estimate of the cost of the road and equipment is stated to be \$12,500,000. Fusan, on Korea Strait, is 287 miles southeast of Seoul, by this line, and although it is not clear how the road will be made to pay, it will open up a rich country in the southern portion of Korea. It will probably make Japanese influence in the peninsula very strong. The gage will be standard (4 ft. 8½ in.) and 75-lb. rails will be used. It is expected that American timber will be used, as nothing fit can be found in the locality; but there is an abundance of stone. There are to be 31 tunnels, aggregating 49,700 ft. The total length of bridges on the line will be 20,500 ft., and the longest ones will be at Rakuto and Kiuko; the former, 1,400 ft., the latter, 1,200 ft.

Southern Railroad Commissioners' Convention.

Railroad commissioners of certain Southern States are to hold a convention at Asheville, N. C., Sept. 10. The notice is issued by Mr. J. A. Webb, Secretary, of Jackson, Miss., and he invites to be present at the convention all railroad commissioners (including those of states outside the Association) and the members of the Interstate Commerce Commission. The President of the Southern Association is Mr. McNis, President of the Mississippi Commission. We do not remember what or how many

states participate in this convention, but the prominent participants are, we believe, those in the territory south of the Ohio and east of the Mississippi River. A convention was held last year in August at Lookout Mountain. The principal subject of discussion then was classification of freight.

Pennsylvania Freight Line Around Newark.

On Monday of last week officers of the Pennsylvania Railroad, with invited guests, took a trip over the Waverly & Passaic Railroad, the Pennsylvania's freight line around Newark, and on their return it was announced that the line had been formally opened. This railroad, double track, leaves the main line at Waverly, about two miles west of Newark, and, running around the south side of the city rejoins the main line near the Meadows freight yards about three miles east of Newark. These yards are on the north side of the main passenger tracks and the new tracks reach them by an overhead bridge. The new railroad is on a high embankment most of the way, the drawbridge over the Passaic River being about 20 ft. above the water; and a large part of the yard itself, at the Meadows, has been raised so as to make uniform descending grades in the tracks leading from the new approach. A large part of the work on the new line has been done by E. M. & J. F. Shanley. The gravel was brought from Metuchen, 15 miles west of Waverly. The drawbridge over the Passaic gives a free channel, for vessels, 100 ft. wide.

It is said that the work of elevating the main (passenger) tracks of the Pennsylvania through Newark will now be actively prosecuted. It will be possible, while this work is going on, to run through passenger trains around by the new freight line; and it is said that the Center street bridge, north of the Market street bridge, on the loop, will be used for through trains while the latter is being rebuilt at the new level.

New Lake Vessels for 1902.

Eighteen steel steamers already under order with the American Ship Building Co. (consolidated lake yards) for delivery in 1902, says *Marine Review*, are to cost \$5,035,000. Fifteen of them are freighters of 4,800 to 6,200 tons capacity each, and their combined cost is \$3,480,000. Their combined capacity is 78,900 gross tons on 18 ft. draught. The passenger steamers, two for the new Detroit & Buffalo line and one for the White Star line of Detroit (a duplicate of the "Tashmoo"), are all to be built in Detroit and will cost about \$1,555,000. This high figure is due to the great size and immense power of the two sidewheelers that are to be built for the Detroit-Buffalo service. The several works of the big ship building company are not yet entirely filled for the winter.

A Thirsty Snake.

The dearth of sea-serpents this year has driven the story tellers to the mountains, and one of their latest productions is the following, which appears in the *Parkersburg* (W. Va.) *News*:

"As the northbound passenger on the Dry Fork Railroad was passing over a curve near a steep mountain side just below Carr's camp, between Horton and Hendricks, to-day, a huge rattlesnake, many of which infest the mountains of that section, leaped into the rear passenger car of the slowly moving train, through a window, coiling itself on a seat and creating a panic among the passengers. It was finally killed after it had put up a fierce battle."

Although we have not verified this story, we do not dare to doubt it; for, with floods everywhere else in the country, a snake which is compelled to try to exist on Dry Fork must lead a dreary life; and is excusable for taking desperate measures to get something with which to wet his parched tongue. We understand that in jumping for the train he first aimed at the window just ahead of the buffet in the dining car. Failing to make a landing there he had to tackle a common passenger car. It appears that all the jugs in this car were tightly corked, which accounts for the "putting up" of a "fierce battle" by the snake.

Block Signaling by Telephone on the Southern Pacific.

According to the *Oakland* (Cal.) *Enquirer* the Southern Pacific is preparing to introduce manual block signaling on its line between Oakland (16th street) and Port Costa, 25 miles, and telephones will be used to send the communications from station to station. There will be eight intermediate block stations and the longest block section will be 5.17 miles.

The Union Pacific is preparing to equip its main line with automatic block signals from Omaha westward to Gilmore, Neb., 10 miles.

New York Rapid Transit.

The contractor for the New York rapid transit tunnel, John B. McDonald has made requisition for \$1,200,000 for expenses during July. It exceeds the amount drawn from the city during any preceding month and brings the total expenses of tunnel work up to date to \$7,000,000.

The working forces on all sections will be doubled during the rest of the summer and fall months.

New Railroad Stations in the South and Southwest.

Several new passenger stations of more than ordinary importance are to be built in the South and Southwest this year. A large brick and stone structure, with a steel-frame trainshed, will be built in Knoxville, Tenn., at a cost of about \$80,000. The contract is about to be awarded for the new Southern Pacific passenger station at San Antonio, Texas, which will cost about \$100,000. A union station will be built under the supervision of the Central of Georgia, for the railroads entering Columbus, Ga., at a cost of about \$45,000. A union station is proposed by the railroads entering Augusta, Ga.

A union station, which is described in another column, is being built in Savannah for the Seaboard Air Line, the Southern and the Plant System. Work is well advanced on the union station for the Chesapeake & Ohio and the Seaboard Air Line in Richmond, Va., which we described last year. The Atchison, Topeka & Santa Fe is building a large station at Albuquerque, N. Mex., which is connected with a hotel, the two buildings costing \$125,000. The Missouri, Kansas & Texas is building a \$35,000 passenger station in Waco, Texas.

Last of the Air-Splitting Train.

The *Baltimore News* reports that the train of five passenger cars which last year was fitted up by the Baltimore & Ohio for Mr. F. U. Adams, with a view to testing his scheme for reducing wind resistance at high speeds, has been dismantled. The cars have dropped back into the "less conspicuous but more remunerative" occupation of running in local trains. The *News* says that the money for Mr. Adams' experiment on the Baltimore & Ohio was furnished by James R. Keene, of New York, and that \$8,000 was used. Mr. Adams has lately written a book entitled, "The Kidnapped Millionaires."

LOCOMOTIVE BUILDING.

The *National of Tehuantepec* has ordered one engine from the Baldwin Locomotive Works.

The *Tennessee Copper Co.*, 11 Broadway, New York City, is in the market for one locomotive.

The *Bismarck, Washburn & Great Falls* has ordered one engine from the Baldwin Locomotive Works.

The *Mineral Range* has ordered four consolidation and two six-wheel locomotives from the Rogers Locomotive Company for December delivery. The consolidation engines will weigh 200,000 lbs., with 180,000 lbs. on drivers; will have 20-in. x 30-in. cylinders, 55-in. driving wheels, straight-top boilers with working steam pressure of 200 lbs., 375 tubes 2¼ in. in diam. and 14 ft. long, fire-boxes 126 in. long and 40 in. wide, tank capacity for 6,000 gals. of water and 10 tons of coal. The switching engines will weigh 120,000 lbs.; they will have 19-in. x 26-in. cylinders, 51-in. drivers, straight top boilers with working steam pressure of 180 lbs., 217 tubes 2¼ in. in diam. and 12 ft. long, fire-boxes 108 in. long and 33½ in. wide, tender capacity for 3,000 gals. of water and four tons of coal. The specifications for all include Westinghouse brakes, Gollmar bell ringers, Monarch brake-beams, Sargent brake-shoes, Gould couplers, Jerome packings, Consolidated safety valves, Leach sanding devices, Michigan lubricators, French springs, Ashcroft steam gages, La-trobe tires.

The *Mexican Central*, as previously noted, has ordered eight six-wheel switch engines and 15 consolidation freight locomotives from the American Locomotive Co., the former to be built at the Pittsburgh and the latter at the Brooks works. The switchers will weigh 110,000 lbs. and have 19-in. x 24-in. cylinders; 50-in. drivers; and Belpaire boilers with 180 lbs. steam pressure and 272 charcoal iron tubes 2 in. in diam. and 139½ in. long. The fire-boxes will be 90 in. long and 39½ in. wide, and the tenders will have a capacity for 3,900 gals. of water and six tons of coal. The consolidation engines will weigh 180,000 lbs., with 160,000 lbs. on the drivers, and have 21-in. x 26-in. cylinders; 55-in. drivers; and Belpaire boilers with 180 lbs. steam pressure and 374 charcoal iron tubes, 2 in. in diam. and 133½ in. long. The fire-boxes will be 120 in. long x 38½ in. wide, and the tenders will have a capacity for 6,000 gals. of water and 12 tons of coal. The switch engines will have Player brake-beams on the tenders and the consolidations National-Hollow tender brake-beams and Leach sanding devices. The following special equipment is common to all: Westinghouse air-brakes, Taylor iron axles, Tower pilot couplers, Westinghouse friction draft gear on tenders, Friedman non-lifting injectors, asbestos piston rod and valve rod packing, Crosby safety valves and steam gages, Nathan lubricators, Scott springs, Johnstone flexible stay-bolts and Johnstone blow-off cocks.

CAR BUILDING.

The *Norfolk & Western* will build 250 box cars at its Roanoke shops.

The *Southern Pacific* has ordered one private car from the Pullman Co.

The *California Northwestern* has ordered six coaches from the Pullman Co.

The *Chicago Great Western* has ordered four chair cars from the Pullman Co.

Armour & Co. are reported to have asked bids on from 500 to 600 refrigerator cars.

The *Canton-Akron* has ordered eight 60-ft. motor cars from the St. Louis Car Co.

The *Delaware, Lackawanna & Western*, it is reported, has asked bids on 1,000 box cars.

The *Chicago & Alton* has ordered two cars for passenger service from the Pullman Co.

The *Choctaw, Oklahoma & Gulf* is in the market for 100 box cars of 60,000 lbs. capacity.

The *Erie* is reported to be in the market for a large number of freight cars of various kinds.

The *St. Louis & San Francisco* has ordered 14 box cars from the American Car & Foundry Co.

The *St. Louis & San Francisco* has ordered 200 freight cars from the American Car & Foundry Co.

The *Hammond Iron Works* are having five cars built at the Milton works of the American Car & Foundry Co.

The *Intercolonial* has ordered 50 box cars from the Rathbun Company and 500 box cars from Rhodes, Curry & Co.

The *Southern* has ordered 100 box cars from the American Car & Foundry Co., to be built at Jeffersonville.

The *Lake Erie, Alliance & Wheeling* has ordered 200 coal cars of 60,000 lbs. capacity from the American Car & Foundry Co.

The *Florida East Coast* has ordered four parlor, 10 passenger and six baggage and express cars from the American Car & Foundry Co.

The *Southern Pacific* has placed a second order for one Gordon spreader with H. H. MacDuffee, Sole Agent for the Gordon earth and ballast spreader.

The *Pennsylvania* has ordered 400 box cars to be built immediately at the Altoona shops. It is reported that this road will soon order another large lot of freight cars.

The *Canada Northern* has ordered 500 box cars of 60,000 lbs. capacity from the Illinois Car Equipment Co. They will measure 34 ft. long. The specifications include Monarch brake-beams, Buckeye couplers, Westinghouse air-brakes, Hutchins roof and Chicago grain door fixtures.

The *Canadian Pacific* will build, in its own shops, 275 wooden box cars of 60,000 lbs. capacity, 300 wooden box cars of 80,000 lbs. capacity and 177 flat cars of 60,000 lbs. capacity; all to be finished in October. The 30-ton box cars will weigh 32,000 lbs., and be 34 ft. 5¼ in. long, 8 ft. 4¼ in. wide, and 7 ft. 1¼ in. high inside. The 40-ton box cars will weigh 36,000 lbs. and be 36 ft. long, 8 ft. 6 in. wide and 7 ft. 6 in. high inside. The flat cars will weigh 25,000 lbs. and be 35 ft. long and 8 ft. 10 in. wide. The following special equipment is common to all: Westinghouse air-brakes, Butler draft rigging, Sherwin-Williams paint and Canada Spring Co.'s springs, Dunham doors, Chicago roofs and Monarch couplers will be used on the box cars and Hein couplers on the flat cars. In addition to the above there will be used and made by the road: Steel axles, metal bolsters, M. C. B. journal boxes and lids and cast-iron wheels.

BRIDGE BUILDING.

ANACONDA, MONT.—We are told that the Anaconda & Pacific will build a through plate girder bridge over Colorado street.

ARLINGTON, WASH.—The Northern Pacific will build a steel bridge 500 ft. long over Stillaguamish River at Arlington. There will be one 200-ft. through span, and six 50-ft. D. P. girders. The company is putting in the foundations.

BAY CITY, TEXAS.—The question of building a bridge over Colorado River, for which a vote was recently taken to issue \$40,000, will be considered by the County Court, on Aug. 12. Jesse Matthews, County Judge.

BUFFALO, N. Y.—Plans are under consideration by the Grade Crossing Commission for a viaduct to carry Louisiana avenue over the New York Central, Lake Shore and Erie tracks at a cost of about \$250,000.

CLEVELAND, OHIO.—The County Commissioners will receive bids, until Aug. 14, for the material and labor of building the superstructure of the Cuyahoga River bridge on the line of Harvard Road, between Brooklyn and Newburg townships. J. C. Dorn, Clerk of the Board of Commissioners.

The Director of the Department of Public Works is about to make plans for rebuilding the drawbridge over Cuyahoga River at Jefferson street.

CONNEERSVILLE, IND.—Bids are wanted, Aug. 5, for building three steel bridges. H. M. Broadus, County Auditor.

COOKSHIRE, QUE.—N. S. Baker, Secretary-Treasurer of the Municipality, is receiving bids for a steel bridge.

DURAND, WIS.—A steel bridge to cost \$128,000 is proposed over Chippewa River.

EAST HARTFORD, CONN.—The Hartford Street Ry. has asked permission to build a trestle over the steam railroad tracks on Main street.

FINDLAY, OHIO.—Plans are reported being made for the abutments for the new bridge which will be built over Blanchard River at Cory street this fall.

FORT DODGE, IOWA.—It is reported that the city has made an agreement with the Chicago, Rock Island & Pacific, the Des Moines & Fort Dodge and the Minneapolis & St. Louis railroads, whereby the railroads agree to build the south approaches of the proposed viaduct over the tracks on Third street.

HUMBERSTONE, ONT.—A bridge will be built on the town line between Crowland and this place. Address E. W. Fares.

INDIANAPOLIS, IND.—It is stated that the Chicago, Indianapolis & Louisville will build a new steel bridge over White River at Broad Ripple.

MEADVILLE, MISS.—The County Board of Supervisors are about to issue \$32,000 of bridge bonds for building four bridges.

MENDON, MICH.—We are told that Wm. Carlenord will receive bids, before Sept. 1, for a 150-ft. steel bridge over St. Joseph River, in the Township of Mendon.

NEW YORK, N. Y.—A board composed of Capt. G. A. Converse, Commander J. H. Perry, Naval Constructor D. W. Taylor, Civil Engineer H. H. Rousseau and Lieut. G. C. Davison, is considering the question of building a bridge from the main yard to the Cob Dock in the Brooklyn Navy Yard. Congress appropriated \$115,000 about a year ago for this bridge, which will probably be a bascule draw.

NORTH HENDERSON, ILL.—We are told that a bridge is proposed on the town line near North Henderson. Address John Brady, Aledo, Ill.

OTTAWA, ONT.—Bids are wanted, until Aug. 9, by the Department of Public Works, for the removal of the superstructure and other work at a bridge at Burlington Channel, Wentworth County.

PARKERSBURG, W. VA.—The Baltimore & Ohio contemplates repairing its bridge over the Ohio River at this place.

PEMBERVILLE, OHIO.—A bridge will be built over Portage River, on the county line northeast of Pemberville.

READING, PA.—According to report, estimates are wanted on a bridge over Front street, for the Reading & Southwestern Electric Ry. The bridge will be 97 ft. long, built of concrete and iron, with approaches at each end measuring 150 ft. The approximate cost is \$25,000.

ROSCOE, MO.—We are told that a steel bridge about 300 ft. long is proposed over Osage River at this place. W. A. Ingram, County Surveyor and Bridge Commissioner, Ohio, Mo.

SALT LAKE CITY, UTAH.—The County Commissioners have ordered plans made for a bridge over Ogden Canyon, to replace the structure destroyed last spring.

SANGAMON, ILL.—We are told that a bridge is proposed over Camp Creek in Sangamon Township. W. H. Firkie, of Blue Ridge, Ill., is Chairman of the committee.

SCARSDALE, N. Y.—The New York Central will build a bridge over the tracks at the new station here.

SEABREEZE, FLA.—The Peninsula Bridge Co. was recently incorporated in Florida and, according to report, will build a toll bridge at this place. C. C. Post, C. A. Ballough and W. E. Ballough are interested.

SEATTLE, WASH.—The Seattle Electric Co., according to report, is about to let a contract for a viaduct, about 2,600 ft. long, over the C. & P. S. tracks, on Fourth avenue.

SHERWOOD, MD.—The Talbot County Commissioners have passed an order for a bridge over the Northern Central tracks at Sherwood Station on the Joppa Road. The cost will be about \$14,000.

SPRINGFIELD, MASS.—The Connecticut River Bridge Commission has filed its report showing the height, location, etc., of the proposed bridge. George G. Crocker is Chairman of the Commission.

Plans have been agreed upon for the St. James avenue bridge over the New England railroad tracks. The structure is 45 ft. long, 66 ft. wide, and will have two sidewalks each about 10 ft. The County Commissioners had ordered a 120-ft. bridge at this place at a total cost of \$170,000.

TAUNTON, MASS.—According to report, the City Engineer has been notified by the New York, New Haven & Hartford that the railroad is ready to begin work on abolishing the grade crossings on Middleboro avenue and Richmond street. Bids will probably be wanted at once by the railroad.

TERRE HAUTE, IND.—Bids are wanted, Aug. 24, by the County Commissioners for the eight-span bridge over Wabash River, as stated in our advertising columns. James Soules, Auditor.

TRENTON, N. J.—Charles A. Sims & Co. have the contract for building the new bridge over the Delaware River for the Pennsylvania R. R. The bridge will have seven spans and will be of solid masonry.

VICKSBURG, MISS.—The Secretary of War has approved the plans for building four bridges on the new road in the National Military Park, and the Commissioners are authorized to contract for the work. Wm. T. Rigby, Commissioner.

WELDON, N. C.—The Seaboard Air Line has let the contract for the renewal of the six-span bridge over Roanoke River at Weldon, to the Phoenix Bridge Co. There are four through truss spans and two deck-plate girder spans. The total length is 828 ft.

WHITECLIFFS, ARK.—The Kansas City Southern Ry. is considering building a bridge over Little River, but nothing has been done except to obtain permission from the State to cross this river.

WOODSDALE, OHIO.—The Commissioners of Butler County are considering building a Pratt truss bridge over Miami River in Woodsdale. It is to have one span of 177 ft., two spans each of 161 ft. 28 in. The cost is estimated at \$40,000. L. A. Dillon, County Surveyor, Hamilton.

YELLVILLE, ARK.—We are told that Marion County is considering building a bridge over Crooked Creek. W. E. Noe, County Judge.

Other Structures.

BELLAIRE, MICH.—The Bellaire Portland Cement Co. has been organized, with a capital of \$350,000. It has 1,000 acres of land at this place. C. E. Densmore is Secretary. George Reed, of Mt. Pleasant, John C. Dooling, and Judge S. B. Daboll, of St. Johns, Mich., are interested.

BELPRE, OHIO.—An officer of the Baltimore & Ohio is reported as saying that the Parkersburg shops of the B. & O., will be removed to Belpre, on the other side of the Ohio River from Parkersburg, as soon as the bridge is strengthened so that heavy locomotives can cross.

BIRMINGHAM, ALA.—The Birmingham Railway, Light & Power Co. has recently finished plans for the new car house to replace the structure burned several months ago. The house will be at Avenue F and Twenty-second street. It will be built of brick, cement and steel, and will have a frontage of 250 ft., and be 190 ft. deep.

CHATTANOOGA, TENN.—The Nashville, Chattanooga & St. Louis has plans made for a large office building at Market and West Ninth streets.

CHICAGO, ILL.—Work has been begun for the large plant of the Hicks Locomotive & Car Works at Chicago Heights. Besides the buildings, which will accommodate 30 locomotives and 12 passenger cars, track room will be provided for about 200 freight cars. There will be six buildings so designed that extensions can be built later. The main building will have a frontage of 810 ft. The machine shop will be 100 x 300 ft.; erecting shop, 170 x 175 ft.; foundry, 100 x 350 ft.; office, 30 x 70 ft. There will also be a building for storage purposes.

Three new suburban stations will be built on the Chicago Division of the Wabash. They will be at Chicago Ridge, Cardiff and Palos Park.

MUNCIE, IND.—A contract for building the union station in Muncie, to be used by the Big Four and the Lake Erie & Western, has been let to George B. Swift & Co., Muncie. The contract amounts to about \$30,000.

NEW HAVEN, CONN.—Plans and specifications are reported made for a new mill for the rod department of the National Wire Corporation. When this building, which is to be 210 x 175 ft., is finished, plans will be made for other buildings.

Plans have been made for new factory buildings on River street for the National Pipe Bending Co. The contract is to be let at once.

NEW YORK, N. Y.—The New York Dock Co. is the name of the company formed to take over the property of the Brooklyn Wharf & Warehouse Co. The new company will improve the docks on the Brooklyn front of the East River from Brooklyn bridge south to Red Hook. David H. King, Jr., has charge. Others interested are Messrs. Frederick P. Olcott, Frederick Cromwell, Adrian Iselin, Jr., Walter G. Oakman, George W. Young and Jacob L. Green. The company owns 2½ miles of water front.

Plans for three power houses and one repair shop have been filed with the Department of Buildings, by the Manhattan Ry. Co., the estimated cost of which is \$133,000. The location of these buildings will be at 173 Spring street, 356 West 53rd street, 110th street, North Side, east of Manhattan avenue, and at 180th street and La Fontaine avenue.

NIAGARA FALLS, N. Y.—The Common Council has granted a permit to the McPherson Switch & Frog Co. to build a plant on land of the Niagara Falls Power Co., on Iroquois street. The building will be of steel, 75 ft. wide and 100 ft. long.

OMAHA, NEB.—It is reported that the Union Pacific will erect two buildings this fall for the proposed shops in Omaha. The other work will be done next year.

PATERSON, N. J.—The Jersey City, Hoboken & Paterson (electric) R. R. will build car sheds and repair shops on Pine street.

PITTSBURGH, PA.—The Pittsburgh Wire & Steel Co. gives notice that application will be made to the Governor, on Aug. 14, for incorporation, with a capital of \$2,000,000. The company, it is said, will build a large independent plant on the line of the Pittsburgh & Lake Erie a few miles south of Pittsburgh. Among those interested are O. Dempster, Thomas Walker, Lieut. Thos. W. Fitch, John W. and Robert Garland.

SCHENECTADY, N. Y.—The American Locomotive Co. has made plans for enlarging and increasing the capacity of its plant at Schenectady at a cost of about \$500,000.

TOLEDO, OHIO.—The plant of the Toledo Bridge Co. will soon be enlarged by three new buildings. Plans are being made for a pattern and store building 60 x 30 ft., storeroom 64 x 15 ft., and a paint house 40 x 20 ft. Bids for the material will soon be wanted.

TROY, N. Y.—Plans for the union station at Troy are reported made and are on exhibition at the N. Y. Central's Roadmaster's office in Troy. The station will be of pressed brick with stone trimmings. The general dimensions are 400 x 47 ft., extending from Broadway to Fulton street. A subway will be built below the tracks.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvii.)

Train Despatchers' Association.

This Association held its 14th annual convention at San Francisco, June 11. The President for the ensuing year is John P. Mann (H. & T. C.), Ennis, Texas. Mr. J. F. Mackie, of Chicago, was re-elected Secretary, Treasurer and Editor.

From the report, printed in the *Train Despatchers' Bulletin*, we learn that 62 members were present at the meeting. Fifty-one new members were elected and the total present membership is 629. The Treasurer's report showed a balance of \$224 on hand. A memorial to the American Railway Association was adopted recommending the use of positive meeting points between trains of the same class, either for all trains on a division or for a part of the trains.

Secretary Mackie was presented with a gold watch. The next convention will be held at Pittsburgh, Pa., June 17, 1902.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. J. W. Howgate, of Schenectady, N. Y., has been appointed Superintendent of the American Locomotive Co.'s plant at Manchester, N. H.

—Mr. Wm. H. Gummer, formerly General Baggage Agent of the Lehigh Valley, died at Burlington, N. J., July 24. During Mr. Gummer's connection with the Lehigh Valley, 1894-1900, an entire new system was organized in the Baggage Department.

—Colonel William Eliot Barrows, President of the Welsbach Light Co., who died at his home in Philadelphia, July 30, was at one time Manager of the Hinkley Locomotive Works at Boston. Subsequently he was connected with Pullman's Palace Car Co.

—Mr. Albert E. Mitchell, whose appointment as Mechanical Superintendent of the Erie Railroad was noted in this column July 12, will shortly move his office to Susquehanna, Pa., where, among other improvements, he will establish a large testing laboratory.

—Mr. Henry F. Dowst, who recently resigned from the General Managership of the Washington County Railroad, had held that position since the road was opened in 1898. Born in Vienna, Me., he began railroad service as an agent for the Maine Central, later becoming Superintendent of the Eastern Division, with headquarters in Bangor. Upon leaving the Maine Central in 1898 Mr. Dowst was elected General Manager of the new Washington County road.

—Mr. Joseph R. Hixson, General Eastern Freight Agent of the Chicago, Milwaukee & St. Paul, at New York City, died suddenly at his home in Elizabeth, N. J., July 24, at the age of 52. Mr. Hixson entered railroad service in 1861, with the Delaware, Lackawanna & Western. Later he was with the Ithaca & Athens, also the Geneva, Ithaca & Athens, the Red Line Transit Co., and from 1878 to 1885, he was General New England Agent of the Chicago, Milwaukee & St. Paul at Boston. In January of 1885 he was appointed to the office he held at the time of his death.

—Mr. D. W. Cooke, the newly appointed General Passenger Agent of the Erie Railroad, was born at Lewiston, N. Y., Dec. 31, 1863. He began his railroad service on the Chicago & Northwestern in 1881. Afterward he went to the Chicago, St. Paul, Minneapolis & Omaha. He later was in Dallas, Tex., as Freight Agent for three years, and then went to the Wisconsin Central at Milwaukee. From this position he went to the Chicago Great Western, where he became Assistant General Passenger Agent, and in 1896 became Assistant General Passenger Agent on the Erie.

—Mr. J. C. Gleason, who was recently appointed Division Superintendent of the Detroit Southern, is 45 years old, having been born Nov. 12, 1856. His first railroad work was with the Cincinnati & Eastern at Williamsburg, Ohio. He later became Train Despatcher and Superintendent of Telegraph, with headquarters at Cincinnati. In February, 1887, the name of the road was changed to Ohio & Northwestern, and a year later it was changed to Cincinnati, Portsmouth & Virginia, at which time Mr. Gleason was appointed Trainmaster, holding the position until 1893. He was then Superintendent of Transportation for 5 years when he became Superintendent. On Jan. 22, of 1901, the road passed into the hands of the Norfolk & Western, and Mr. Gleason was appointed Assistant Superintendent, which position he resigned on June 20 to become Superintendent of the Detroit Southern, with headquarters at Springfield, Ohio. Mr. Gleason was with the C., P. & V. just 24 years.

—Mr. J. B. Kemp, who, on July 1, of this year, became Superintendent of the Vicksburg Division of the Yazoo & Mississippi Valley (Illinois Central), was born Feb. 18, 1843, and was brought up in Maryland. He began his railroad career in 1859 on the Maryland & Delaware, now a part of the Philadelphia, Wilmington & Baltimore. He was on the Union Pacific at Little Laramie River, in 1867, and afterward at various places until the completion of that road. From 1870 until 1875 he was with the Southern Railroad Association (Mississippi Central) as freight agent at Canton, Miss., and then became Superintendent of the Mississippi Division of the Mississippi Central, from which position he resigned in January, 1877, when that company was acquired by the Illinois Central. He was re-employed by the Illinois Central in 1878, and in July, 1884, became Superintendent of the Canton, Aberdeen & Nashville (Illinois Central). In 1888, Mr. Kemp was transferred to the Mississippi & Tennessee, now the Memphis Division of the Illinois Central, and in 1898 was transferred to the Aberdeen Division. On July 1, of this year, he was transferred as above stated.

—Mr. James F. Lewis, of the Rand Drill Co., died on July 23, at Boston, where he was taken sick with pneumonia while on his way from Sherbrooke, Canada, to New York City. Mr. Lewis was born at Blandford, Mass., May 26, 1840. He enlisted in the Third Con-

necticut Volunteers at the first call in the Civil War and was wounded at the battle of Bull Run. His first business was at Westfield, Mass., with Rand, Lewis & Rand, whip makers. About 1876 he went to America, N. Y., as Superintendent of the Manhattan Mining Co., and in 1881 he moved to Quinnimont, W. Va., as Superintendent of a mine there. He joined the Rand Drill Co. in 1884, and has been associated with that company ever since. In 1892 he went to Chicago to look after the interests of his company at that point, and six years later moved to Sherbrooke, Canada, to give his entire attention to the business of the Canadian Rand Drill Co., of which he was president. He was a member of many associations, including the American Society of Civil Engineers, American Society of Mining Engineers, Canadian Mining Engineers, American Institute of Mining Engineers, Western Society of Engineers, British Iron & Steel Institute, and the Engineers' Club (New York). Mr. Lewis had endeared himself to a large circle of friends, and he was everywhere admired and respected.

—Mr. Joseph O. Osgood, who succeeds Mr. Thompson as Chief Engineer of the Central of New Jersey, was born in Cohasset, Mass., Dec. 28, 1848. For 10 years beginning about 1865, Mr. Osgood was employed in location and building of railroads in New England, Delaware, Maryland, Colorado and New Mexico. He was also at times Assistant Resident or Division Engineer. For five years up to 1880, he was Resident Engineer and Inspector for the Harbor Commissioners of Massachusetts on improvements in Boston Harbor. He was later in charge of construction and operation of the California Southern Railroad for two years, and from 1883 to 1884, he was Chief Engineer of the Boston, Hoosac Tunnel & Western. During the following year he was engaged in private practice as Consulting Engineer. Mr. Osgood re-entered railroad service in 1886, and for a year was Chief Engineer of the Toledo, St. Louis & Kansas City, in charge of the change of gage. The following year he was Chief Engineer of the Lake Shore & Michigan Southern. While Mr. Osgood's headquarters have been in New York City since 1889, he has been in Sabine, Tex., most of the time from November, 1896, to May, 1900, as Engineer and Manager of the Sabine Land & Improvement Co., improving the deepwater frontage of that company by building wharves and slips and filling a town site. Since May 1 of last year, he has continued his general practice, making railroad examinations and plans for sewage disposal.

ELECTIONS AND APPOINTMENTS.

Atchison, Topock & Santa Fe.—George A. Masters has been appointed Assistant Bridge Engineer, effective July 1.

Chicago & Erie.—G. A. Coe has resigned the position of Superintendent of Transportation to assume other duties, and that office will be abolished.

Chicago, Milwaukee & St. Paul.—E. O. Reeder has been appointed Assistant Chief Engineer of this company, effective Aug. 1.

Florence & Cripple Creek.—With the resignation of F. R. Rockwell, the office of Superintendent was abolished. J. H. Waters has been appointed General Superintendent.

Grand Trunk.—J. E. Muhlfeld, Master Mechanic at Montreal, has resigned to accept a place with the American Locomotive Co. Effective Aug. 1. Wm. Gell succeeds W. Kennedy as Locomotive Foreman at Sarnia Tunnel.

Hillsboro.—The General Passenger Agent is W. B. Beville, not T. D. Rhodes, as stated in the *Official Guide*.

Lake Erie & Western.—A. H. Smith has been appointed General Superintendent in place of P. S. Blodgett, resigned to become General Superintendent of the New York Central.

Santa Fe Pacific.—J. W. White has been appointed Auditor of the Santa Fe lines west of Albuquerque, succeeding C. S. Sutton. His headquarters will be at Los Angeles, Cal.

Sierra Ry. of California.—J. W. Crawley, formerly General Freight Agent of the Rio Grande Western, has been appointed General Freight and Passenger Agent of this company, with office at Jamestown, Cal.

Southern Pacific.—B. A. Worthington has been appointed Superintendent of the Tucson Division, with office at Tucson, Ariz., in place of E. Randolph, resigned to accept service with another company. Effective Aug. 1.

Sydney & Louisville.—William Cayne has been appointed Traffic Manager, with headquarters at Glace Bay, C. B., Canada. The appointment took effect June 7.

Union Pacific.—Alvin W. Krech and Gen. Thomas T. Eckert have been elected directors of this company. Mr. Eckert is a director of the Missouri Pacific, and Mr. Krech is a director in the Wheeling & Lake Erie.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALABAMA AND TENNESSEE RIVER.—This company has been formed to consolidate the Tennessee & Northwestern and the Florence & Northwestern; and also to build a road from Florence, Ala., to some point in Tennessee, not yet determined.

ALBUQUERQUE EASTERN.—This company has been incorporated in New Mexico, with a capital stock of \$1,500,000, to build a road from Albuquerque, northwest 40 miles to the San Pedro coal fields, and to connect the Santa Fe Central.

ATLANTIC, VALDOSTA & WESTERN.—A company known as the St. Johns River Terminal has been incorporated at Jacksonville, Fla., with a capital of \$100,000, to own, operate and connect for purposes of transportation, docks, depots, yards, elevators, etc. It will doubtless be operated by the A., V. & W., as it is incorporated to utilize this company's franchise. The incorporators are: Walter Ferguson, George S. Baxter, W. T. Wilson, Walter Ferguson, Jr., E. C. Long and E. J. L'Engle. (Construction Supplement, March 8, 1901.)

BIRMINGHAM, SELMA & NEW ORLEANS.—We are informed that the contract has been let for the extension of this road from Thomaston, Ala., west 17 miles to within a mile of Myrtlewood. The road will be extended on to the Tombigbee River.

BLACK HILLS & FORT PIERRE.—This road is said to have been purchased from the Homestake Mining Co., by

G. W. Holdredge, General Manager of the Burlington & Missouri River. There are 60 miles of track in the vicinity of Lead and Piedmont, in the eastern part of South Dakota. The road is to be made standard gage.

BRUCE MINES & ALGOMA.—This company, in the Algoma District, Ontario, is advertising for tenders to build 14½ miles of road. Plans are to be seen at the Chief Engineer's office, Bruce Mines, on the River St. Mary, Ont. A. S. Burrows, of Bruce Mines, is Managing Director.

CANADIAN ROADS.—John H. Grey, C. E., of Victoria, B. C., is locating a proposed line of railroad from Kitimaat to Hazelton, B. C., about 100 miles north, the promoters being the Pacific, Northern & Omenica Ry. Co., of British Columbia.

CHICAGO & EASTERN ILLINOIS.—It is said this company will build a link from Hillsdale, six miles northwest to Mecca, Ind., to connect the main line with the Brazil Division.

CHICAGO GREAT WESTERN.—It is said that this company will build a line from Zumbrota, Minn., on the recently acquired Duluth, Red Wing & Southern, southeast to Rochester, on the Winona & Western, about 20 miles.

We are informed that, in accordance with the newly completed surveys, the Sioux City extension will pass through Webster, Calhoun, Sac, Ida and Woodbury Counties, west from Fort Dodge, striking the towns of Somers, Rockwell City, Sac City, Ida Grove, Anthon and Holly Springs. The distance to Sioux City by this route is about 126 miles.

CHICAGO, ROCK ISLAND & PACIFIC.—It is said that this company will build a line 60 miles west from Kansas City to Topeka, Kan., to obviate using the Union Pacific tracks. Surveys are reported as completed, and an entrance to Kansas City gained by the purchase of land west of the city on the north side of the Kansas River.

COLFAX & NORTHERN.—This company has been incorporated in Louisiana, to build a road from Colfax, on the Shreveport & Red River Valley, north 30 miles, to Winnfield, and thence north to the Arkansas State line, with branches. The capital stock is \$50,000, and the incorporators are: J. E. Cole, William Edenborn, Sarah Edenborn, Clarence Ellerbe, Charles H. Teal, P. McIlvried, Allen Rendall. Principal office, Shreveport, La.

COLORADO & GULF.—Articles of incorporation have been filed in Colorado by this company. The capital stock is \$1,000,000, and it is proposed to build a line south and southwest from Durango, Colo., through New Mexico into Arizona. The terminus in Arizona is not yet determined. The incorporators are: C. E. McConnell, Charles E. Herr, Ben W. Ritter, F. R. Graham and L. C. Sheets, of Durango.

CONNECTICUT RAILWAY & LIGHTING.—Judge Rorback has decreed that public necessity and convenience warrant the extension of this company's line north from Ansonia to Seymour, Conn., 5 miles, and also from Waterbury to Watertown, Conn., five miles. These extensions parallel the N. Y., N. H. & H. in both cases.

DETROIT TERMINAL.—Articles of association have been filed by this company, with a capital stock of \$75,000, for the purpose of building a line in the city of Detroit, from Orleans street, east through Guion, Wight and other streets to the city limits. The incorporators are: M. B. Mills, Solon Burt, W. T. Barbour, Michael Brennan, J. H. Walker and others.

EAST MOLINE & WATERTOWN (ELECTRIC).—This company has been incorporated in Illinois, with a capital stock of \$25,000, to build an electric railroad from Moline northeast to Port Byron, 17 miles, via East Moline, Watertown, Hampton and Rapid City. This route parallels the Chicago, Milwaukee & St. Paul.

EEL RIVER & EUREKA.—It is said that this company will extend its road south from its terminus at Burnells, Cal., 15 miles. Surveys will then be made to connect with the California & Northwestern extension at Willits. The Eel River & Eureka is a standard gage road and runs from Burnells north 25 miles to Eureka, Cal.

EL PASO & SOUTHWESTERN.—It is said that this company has been incorporated, with a capital of \$7,000,000, to build the connecting links in Phelps, Dodge & Company's Arizona and New Mexico road from Nacozari, Mex., to El Paso, Texas, by way of Bisbee, Ariz., Clifton, Ariz., and Deming, N. Mex. The length of line is 350 miles.

FLORENCE & NORTHWESTERN.—See Alabama & Tennessee River.

GREENVILLE-PIEDMONT TRACTION.—This company proposes to build a 12-mile electric line from Greenville south to Piedmont, paralleling the Southern. Minimum capital, \$100,000. George M. Bunting, of Chester, Pa., and others are interested.

KINGSTON & CENTRAL MISSISSIPPI.—An officer writes that this company will extend the road north to some point on the Alabama & Vicksburg, which is about 14 miles from the intended terminus, Montrose. The Kingston & Central Mississippi has been recently opened for traffic.

LANCASTER & YORK FURNACE (ELECTRIC).—A charter has been granted this company to build a trolley line from Lancaster, Pa., 20 miles south to York, to connect the towns of Conestoga Center, Mt. Nebo, New Danville, Colemanville and Regnea. The capital is \$200,000.

LEHIGH VALLEY TRACTION.—The contract to build the Allentown & Quakertown branch of this company has been let to Hugh E. Crilly, of Allentown, Pa. The branch will run southeast from Allentown to Quakertown, 20 miles, and it will be one of the links in the new trolley line from Allentown to Philadelphia.

LOUISVILLE, ANCHORAGE & PEWEE VALLEY (ELECTRIC).—This company has been incorporated with the announced intention of building a very extensive system of interurban electric railroads in Kentucky, of which the line running from Louisville to Pewee Valley will be the trunk. From it branches are proposed through the Blue Grass section of the State as far as Stanford and Richmond.

MICHIGAN CENTRAL.—An officer denies the report that the company will build a line from Buchanan to Niles at present. (July 26, p. 540.)

MISSOURI PACIFIC.—An extension on the Lexington branch is reported building, to a connection with the main line, 17 miles.

MOHAWK VALLEY TRACTION.—This company has been incorporated in New York to operate an electric road from Little Falls west seven miles to Herkimer, paralleling the New York Central. The capital is \$80,000, and the directors are: Timothy Dosey, J. Judson Gilbert,

Fred G. Teall, James D. Feeter and Myron G. Bronner, of Little Falls; Henry Churchill, I. B. Devendorf and Henry G. Munger, of Herkimer, and J. D. Smith, of New York City.

NOVA SCOTIA ROADS (ELECTRIC).—Our correspondent writes that E. R. Woods, of Toronto, will build an electric road from Sydney, N. S., east to Glace Bay, 15 miles, paralleling the Sydney & Louisburg.

PACIFIC & IDAHO NORTHERN.—It is reported that L. G. Wilkerson, of Weiser, Idaho, has the contract to build the remaining 45 miles of this company's extension from the Seven Devils copper region southward to the smelter near Weiser, on the main line.

PITTSBURGH, SHAWMUT & NORTHERN.—This road is being changed from narrow to standard gage between Bolivar and Olean, N. Y., a distance of 18 miles. The line connects with the Buffalo & Allegheny division of the Pennsylvania at Olean.

ST. LOUIS SOUTHWESTERN.—Surveys are reported for a north and south extension, 120 miles long, from Malden, Mo., to connect with Memphis, Tenn.

SARATOGA TRACTION.—It is said that this company will extend its line 13 miles southeast from Ballston, N. Y., to Mechanicsburg, paralleling the Delaware & Hudson.

SOUTHERN PACIFIC.—An officer writes that the construction of the extension from Cochise to Naco, Ariz., (mentioned July 12, p. 508) as surveyed, has not been decided upon.

SOUTHWESTERN OF ARIZONA.—Orman & Crook, of Pueblo, Colo., are reported as having taken the contract to build 60 miles of this road northwest from Deming Junction, N. Mex., towards Morenci Junction. It is said that Cables & O'Conner, of El Paso, Texas, have the contract from Deming Junction, 90 miles southeast to El Paso, including the El Paso terminals.

SUNFLOWER & EASTERN.—This company has been incorporated in Arkansas, with a capital of \$10,000, to build a railroad from Parchman, Sunflower County, Miss., northeast to Webb, in Tallahatchie County, adjoining, by the most direct and feasible route. The incorporators are: E. M. Roots, F. E. Roots, and M. Roots, Little Rock, Ark.

TENNESSEE & NORTHWESTERN.—See Alabama & Tennessee River.

VERMONT ROADS (ELECTRIC).—The contract for building an electric road from Rutland, 16 miles west to Fair Haven, Vt., has been let to the Adams Construction Co., of Niagara Falls. The proposed line runs parallel to a branch of the Delaware & Hudson.

VICKSBURG & SOUTHEASTERN.—The capital stock of this company (mentioned July 26, p. 540) is \$1,250,000, and the incorporators are: W. L. Wells, P. M. Harding, W. H. Fitzhugh, Vicksburg, Miss.; Lamar Hardy, 35 Nassau street, New York; G. E. Ellis, Utica, Miss.

WABASH.—This company has taken a contract with the Ferguson Company, of New York, to make a tunnel for the Pittsburgh, Carnegie & Western under Mount Washington, near Pittsburgh, and also to build the mile of track between that and the Green Tree tunnel, at a total cost of about \$800,000.

WESTERN TRACTION.—This company has been incorporated in Michigan, with a capital stock of \$1,000,000, to build an electric line from Benton Harbor to Kalamazoo, passing through Dowagiac, Cassopolis, Paw Paw, Decatur and Allegan. The company is composed largely of eastern capitalists, and the length of the proposed line is about 90 miles. It parallels the Michigan Central between Cassopolis and Kalamazoo.

GENERAL RAILROAD NEWS.

ALPENA, GAYLORD & WESTERN.—The stockholders have voted to issue \$2,500,000 bonds to raise money to build the road from Alpena, in the Southern Peninsula of Michigan, to Frankfort, 140 miles west. The first issue will be guaranteed bonds for \$1,500,000, to build the line to Gaylord, 75 miles.

BALTIMORE & OHIO.—It is reported that the voting trust is to be dissolved, although the original limitation does not expire until 1902. William Solomon, Otto H. Kahn, Martin Erdmann, Louis Fitzgerald and Charles Steele are the trustees, and it is said that they will turn the property over to the stockholders early in September.

BOSTON & NORTHERN (ELECTRIC).—This company has absorbed the Lynn & Boston Street Ry. Co., and now includes the following lines: Lowell, Lawrence & Haverhill; Nashua (N. H.) Ry.; Rockport Street; Gloucester Street; Gloucester, Essex & North Woburn; Wakefield & Stoneham; Reading & Lowell and the Lynn & Boston.

CHOCTAW, OKLAHOMA & GULF.—This company is reported to have purchased 22 miles of the Little Rock & Hot Springs Western from Hot Springs Junction, to Iron Mountain Junction at Benton. It is said that the company intends to use this track in connection with the newly acquired "Diamond Jo" line, for a route between Little Rock, Ark., and Hot Springs, Ark., until it can build from Benton to Malvern.

HIDALGO & NORTHEASTERN.—It is said that the option which Wm. A. Chanler and C. D. Wetmore, of New York, held on this company, has expired, and will not be renewed. The reason given is a lack of success on the part of the proposed buyers to obtain a concession from the Mexican Government for the improvement of the Tuxpan Harbor, which was to have been an important port on the proposed extension of the line. The Hidalgo & Northeastern is a 3-ft. gage line, operating 133 miles of road from the city of Mexico, northeast to Pachuca, Tortugas and Irolo.

LYNN & BOSTON.—See Boston & Northern above.

MACON, DUBLIN & SAVANNAH.—The company has filed its first mortgage for \$1,500,000 to cover 50-year 5 per cent. bonds, issued for the purpose of extending the road from Dublin to Vidalia, Ga. (June 7, p. 389). This is the first mortgage or lien ever placed upon the property.

NEW ORLEANS & NORTHWESTERN.—An application has been filed in the Federal Court in Mississippi, to have the \$2,000,000 mortgage of 1890 foreclosed; \$350,000 is now due on this mortgage and default was made on the bonds in 1898.

RUTLAND.—It is said this company will make one corporation of all its lines, which it has heretofore controlled by stock ownership. This consolidation would give the Rutland a straightaway line for 365 miles.